IMPACT AND PROCESS EVALUATION REPORT

INTERIM FRAMEWORK ENERGY MANAGER PROGRAM PY2020

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ABBREVIATIONS

CEM	Certified Energy Managers
CFF	Conservation First Framework
CMVP	Certified Measurement and Verification Professionals
CO_2e	CO_2 equivalent
EF	Emission Factors
EM	Energy Manager
EPP	Energy Performance Program
GHG	Greenhouse Gas
IESO	Independent Electricity System Operator
IF	Interim Framework
NRCan	Natural Resources Canada
NRE	Non-Routine Event
NTG	Net-to-Gross
O&M	Operational and Maintenance
PY	Program Year
SEM	Strategic Energy Management
StatCan	Statistics Canada

EXECUTIVE SUMMARY

E.1 EVALUATION GOALS AND OBJECTIVES

This report documents the findings from the impact and process evaluation conducted for the Energy Manager (EM) program in Program Year (PY) 2020. The Energy Manager program subsidizes the salary of a trained energy manager to work directly with participating facilities to find energy savings, identify smart energy investments, secure financial incentives, and unleash competitive advantage. Energy managers can also identify and help to implement non-incented improvements for the organizations they support.

In April 2019, the IESO began to centrally deliver all provincial energy efficiency programs in Ontario by implementing a new Interim Framework (IF) following a directive from the Ministry of Energy, Northern Development and Mines. The IF replaced the Conservation First Framework (CFF) with an updated portfolio of Save on Energy Programs and was in effect from April 1, 2019, through December 31, 2020.

The goals of the PY2020 evaluation were to:

- Annually verify energy and summer peak demand savings.
- Assess program attribution (net-to-gross or NTG), including free ridership.
- Annually estimate the net greenhouse gas impacts in tonnes of CO_2 equivalent using IESO's Cost-Effectiveness Tool.
- Monitor the overall effectiveness and comprehensiveness of key program elements.
- Conduct annual cost-effectiveness analyses and report on key indicators of cost-effectiveness, including Total Resource Cost (TRC) test, Program Administrator Cost (PAC) test and the Levelized Unit Energy Cost (LUEC) metric.
- Analyze and make recommendations to improve the program.
- Determine customer satisfaction.

E.2 EVALUATION RESULTS

This section summarizes the results of the PY2020 EM non-incented program impact and process evaluation.

E.2.1 IMPACT EVALUATION RESULTS

Although the IF EM program began in PY2019, no non-incented projects were ready for evaluation in time to be reported in the PY2019 evaluation report. Projects completed in PY2019 are included in this report as true up projects. The PY2020 EM non-incented gross verified savings are summarized in

Table 1 and Table 2. The total gross verified energy savings for the EM non-incented program in PY2020 are 6,463 MWh, representing almost 100% of reported savings. True up projects from PY2019 totaled 10,969 MWh of gross verified energy savings, also representing almost 100% of reported savings. When combined, the total gross verified energy savings for PY2020 and PY2019 true up projects are 17,432 MWh—nearly 100% of reported savings. Total gross verified summer peak demand savings for the EM non-incented program are 2.69 MW, representing 105% of total reported savings. Sixty-one percent of the energy savings achieved by the PY2020 sample frame persist to 2022.

The program-level NTG for the EM non-incented measures was 91% for the PY2020 projects, reflecting a free ridership score of 9%. Spillover was not assessed for the program as part of this evaluation. Total net first-year savings for non-incented EM projects evaluated in PY2020 was 15,863 MWh, and net peak demand savings were 2.45 MW.

Table 1: PY2020 EM Non-Incented Energy Savings Summary

Program Year	Projects Evaluated & Reported	Energy Realization Rate	Gross Verified Energy Savings (MWh)	Gross Verified 2022 Energy Savings (MWh)	NTG Ratio	Net Verified Energy Savings (MWh)	Net Verified 2022 Energy Savings (MWh)
2020	69	100%	6,463	4,555	91%	5,882	4,145
2019 True Ups	108	100%	10,969	6,057	91%	9,981	5,511
TOTAL	**177**	**100%**	**17,432**	**10,612**	**91%**	**15,863**	**9,657**

Table 2: PY2020 EM Non-Incented Summer Peak Demand Savings Summary

Program Year	Projects Evaluated & Reported	Demand Realization Rate	Gross Verified Summer Peak Demand Savings (MW)	Gross Verified 2022 Summer Peak Demand Savings (MW)	NTG Ratio	Net Verified Summer Peak Demand Savings (MW)	Net Verified 2022 Summer Peak Demand Savings (MW)
2020	69	105%	1.02	0.81	91%	0.93	0.74
2019 True Ups	108	105%	1.67	0.68	91%	1.53	0.62
TOTAL	**177**	**105%**	**2.69**	**1.49**	**91%**	**2.45**	**1.36**

As shown in Table 3, the EM non-incented program in PY2020 is not cost effective from the TRC test perspective using a benefit/cost threshold of 1.0[1]. From the TRC perspective, benefits totaled $2,106,408 while costs totaled $3,867,573. However, the EM non-incented program in PY2020 is cost effective from the PAC test perspective. The cost effectiveness of the program in PY2020 was negatively affected by the COVID-19 pandemic as fewer projects were implemented, and more administrative support and guidance for the participants under contract was required of the IESO and technical reviewers.

Table 3: PY2020 EM Non-Incented Cost Effectiveness Results

TRC Costs	TRC Benefits	TRC Ratio	PAC Costs	PAC Benefits	PAC Ratio	LC $/kWh
$3,867,573	$2,106,408	**0.54**	$1,323,056	$1,831,659	**1.38**	0.04

Net first year greenhouse gas (GHG) reductions total 1,712 metric tonnes of CO_2 equivalent (CO_2e) for the PY2020 sample frame. As EM non-incented projects focus on electricity savings, these GHG reductions are derived from the avoided generation of electricity. Over the lifetime of the PY2020 sample frame projects, net GHG reductions total 12,218 tonnes of CO_2e.

E.2.2 PROCESS EVALUATION RESULTS

Several completed data collection activities informed the PY2020 process evaluation of the Energy Manager non-incented program, including in-depth interviews with IESO-funded energy managers

[1] The EM non-incented cost effectiveness analysis for PY2020 only includes projects implemented in the calendar year 2020.

and mixed-mode surveys with participants. The key findings and recommendations from the process evaluation can be found in Section E.3, and detailed results can be found in Section 4.

E.2.3 JOB IMPACTS RESULTS

As summarized in Table 4, the EM program created an estimated 68 jobs in PY2019 and PY2020. Nearly all the jobs created from the program were local, with 62 of the 68 total jobs created in Ontario. In terms of full-time equivalents (FTEs), the program created an estimated 61 total jobs.

Table 4: EM Non-Incented Job Impacts

Job Impact Type	Ontario FTE	Canada Total FTE	Ontario Jobs	Canada Total Jobs
PY2019	15	17	18	20
PY2020	42	44	44	48
Total	**57**	**61**	**62**	**68**

E.3 KEY FINDINGS AND RECOMMENDATIONS

The key findings and recommendations derived from the impact and process evaluations are listed in this section.

Finding #1: The technical review process was disorganized, and the robustness of the reviews was inconsistent. The first step of the impact evaluation process was to gather supporting documentation and calculation files for non-incented measures that received a technical review. Acquiring the files from the technical reviewer proved to be slow and incomplete. In several cases, the evaluation team had to ask energy managers to resubmit files that the technical reviewer could not locate. Many of the technical review analyses were well documented and followed industry-standard methods. Around 15% of analyses were rudimentary and failed to correct basic mistakes in energy manager savings calculations. For one project, the peak demand savings estimate was the power draw of the equipment post-retrofit instead of the reduction in peak demand associated with the measure.

Recommendation #1: Encourage better documentation from the energy managers. In the EM Quarterly Report Excel workbooks, details on how the baseline and post-project conditions were quantified and how estimated annualized electricity savings were commonly minimal (e.g., simple statements such as "Used RETScreen" were provided). Other workbooks referenced specific names of files that presumably contained the savings calculations used to determine reported savings values, which were not included in the project documentation. At the very least, project documentation should include the spreadsheet analyses used to calculate energy and peak demand savings for each project.

Recommendation #2: Increase the level of detail for non-incented project documentation for projects estimated to achieve less than 100 MWh/year. Provide energy managers with clearer guidelines on the type of information required to accurately verify the savings for common measure types.

Finding #2: Most projects assumed that energy consumption was unaffected by the COVID-19 pandemic. Several energy managers implemented optimization measures in March 2020 to modify the lighting and HVAC schedules of buildings. These measures were analyzed using IPMVP Option C regression models in RETScreen using pre-pandemic consumption data as the baseline. Energy and peak demand savings were calculated using consumption data from March 2020 onward when varying levels of COVID-19 restrictions were in place. The energy manager and technical reviewer clearly documented the implicit assumption that building operation (occupancy, hours of operation) did not change due to the COVID-19 pandemic, which is not always accurate as the effects of the pandemic are far-reaching and complex, and the effect on organizations varied widely by industry.

Recommendation #3: Ensure consistency from energy managers and technical reviewers concerning adjustments for Non-Routine Events (NREs) such as the COVID-19 pandemic. Adjustments for NREs can be achieved by normalizing the data across pandemic-impacted periods or extending baseline and performance periods to include "normal" operations.

Finding #9: The impact of IESO-funded energy managers on the IESO savings goals goes far beyond the non-incented measures detailed in this report. IESO-funded energy managers were responsible for 23,970 MWh reported energy savings in PY2020, accounting for 11% of total reported energy savings across the Business Retrofit, PSUP, and EM non-incented programs. Organizations with IESO-funded energy managers also have 34 PSUP projects under contract that are not yet in service, so their share of IESO portfolio savings is expected to greatly increase in the next evaluation reports.

Finding #10: Energy managers implemented much larger projects, on average, than the general population in the Business Retrofit program. Retrofit projects led by IESO energy managers averaged 103,911 kWh of annual savings, compared to 60,609 kWh for the rest of the program.

Recommendation #9: Develop a Reporting Template to track the verified savings achieved from projects implemented by IESO-funded energy managers across the entire portfolio.

Finding #13: Energy managers achieve savings across several fuel types, but only kWh and kW savings are reported by the IESO. Energy managers suggest that more information

such as case studies and calculators would support the identification and reporting of all types of savings they achieve.

Recommendation #12: Develop case studies, training, calculators, and other reference materials to support energy managers in achieving, calculating, and reporting all savings in their organizations, including water and fossil fuels. Publish a measure substantiation sheet that includes fuel and water savings to be included with the IESO's Measures and Assumptions List (MAL).

Recommendation #13: Consider updating the Energy Manager Quarterly Submission document to include sheets for reporting water and fossil fuel savings achieved. Consider including water and fossil fuel impacts in the Energy Manager cost effectiveness calculations to provide a better review of the program.

Finding #15: Overall program satisfaction was high among Energy Manager program participants. However, participants were least satisfied with reporting requirements and the technical review process. A common theme was related to the turnaround time it takes to receive feedback on the reports being very lengthy. Energy managers were also least satisfied with reporting and technical review processes, as summarized in Finding #17.

Recommendation #14: Ensure IESO and technical review staff set clear expectations with participants regarding the review process and timeline to avoid participant frustration.

Recommendation #15: Coordinate with technical review staff to ensure there are set goals for technical review timelines.

Finding #17: Energy managers expressed moderate levels of satisfaction with the overall program. Energy managers are satisfied with training offered by the IESO and technical reviewers, but satisfaction declines once the energy managers have to calculate and report savings they achieve. Pain points include the support for non-incented project savings calculations, reporting requirements, and technical support.

Recommendation #17: Work to develop technical review and program support staff experts in common industries that participate in the EM program, such as manufacturing, mining, and universities. These industries have vastly different patterns in energy usage, facilities, and business needs which result in vastly different energy-saving projects and calculations. By developing experts to work with energy managers in specific industries, the savings calculation, reporting, and technical review process should be less burdensome as experts leverage lessons learned and commonalities from similar situations.

Finding #26: Eighty-one percent of participants surveyed indicated that they would keep their energy manager employed in the absence of an incentive. In order to keep the role, many participants said the energy manager would need to expand their responsibilities and maintain a broader focus than just energy efficiency. Without an incentive for a full-time energy manager, participants would benefit most from technical assistance from the IESO to complete applications, create baselines, and calculate potential energy savings.

Recommendation #23: Encourage participants to make a broader commitment to energy efficiency by adopting a Strategic Energy Management (SEM) approach. Consider developing tools and providing training and education to organizations so they can take ownership of and manage energy efficiency throughout their organization.

Finding #27: Energy managers believe that increased training and engagement from the IESO with senior management at their participating organizations would allow the organizations to build internal capacity to improve operational efficiency.

Recommendation #24: Consider creating training and educational resources aimed at senior management to encourage the development of internal capacity to increase efficiency of operations. Resources for senior management should be more strategic than technical, focusing on energy efficiency as an operational resource.

Finding #28: The EM non-incented program in the IF has resulted in the creation of 68 jobs throughout Canada, most of which are direct jobs in Ontario's other provincial and territorial government services industries.

1 INTRODUCTION

1.1 EVALUATION GOALS AND OBJECTIVES

The Independent Electricity System Operator (IESO) retained EcoMetric Consulting, LLC, to evaluate the 2019-2020 Interim Framework (IF) Industrial Programs administered in Ontario. The industrial programs incentivize equipment measures, engineering studies, and energy management services for commercial and industrial facilities in Ontario.

The goals of the PY2020 evaluation were to:

- Annually verify energy and summer peak demand savings.
- Assess program attribution (NTG), including free ridership.
- Annually estimate the net greenhouse gas impacts in tonnes of CO_2 equivalent using IESO's Cost-Effectiveness Tool.
- Monitor the overall effectiveness and comprehensiveness of key program elements.
- Conduct annual cost-effectiveness analyses and report on key indicators of cost-effectiveness, including Total Resource Cost (TRC) test, Program Administrator Cost (PAC) test, and the Levelized Unit Energy Cost (LUEC) metric.
- Analyze and make recommendations to improve the program.
- Determine customer satisfaction.

This report contains the impact and process evaluation findings conducted for the Energy Manager (EM) program in Program Year (PY) 2020. Energy managers identify and help to implement non-incented improvements for the organizations they support. These non-incented projects are the focus of the Energy Manager program evaluation discussed throughout this report.

In April 2019, the IESO began to centrally deliver all provincial energy efficiency programs in Ontario by implementing a new Interim Framework following a directive from the Minister of Energy, Northern Development and Mines. The IF replaced the Conservation First Framework (CFF) with an updated portfolio of Save on Energy Programs and was in effect from April 1, 2019, through December 31, 2020. Energy managers started the process of completing the non-incented measures in the second half of 2019. Projects implemented in PY2019 are characterized as true ups in this report.

1.2 PROGRAM DESCRIPTION

The Energy Manager program subsidizes the salary of a trained energy manager to work directly with participating facilities to find energy savings, identify smart energy investments, secure financial incentives, and unleash competitive advantage. Energy managers can identify capital improvements eligible for incentive payments through the Process Systems Upgrades Program (PSUP), Business Retrofit, or Energy Performance Program (EPP). The savings from these projects accrue to the program that incents the improvement.

Energy managers can also identify and help to implement non-incented improvements for the organizations they support. Since 2016, EM contracts require that 10% of the savings goal must be through non-incented improvements. IESO tasked EcoMetric with verifying the energy savings from these non-incented projects while examining the EM cost-effectiveness and program processes. A broader perspective was taken to document the value of EM thoroughly since EM is an enabling program that drives participation and savings in other programs. These non-incented projects are the focus of the Energy Manager program evaluation discussed in this section. Common non-incented measures include optimization, capital equipment upgrades, operational and maintenance (O&M), and behavioural measures.

2 METHODOLOGY

This section of the report outlines the methodologies used in the PY2020 evaluation of the EM program.

2.1 EVALUATION APPROACH

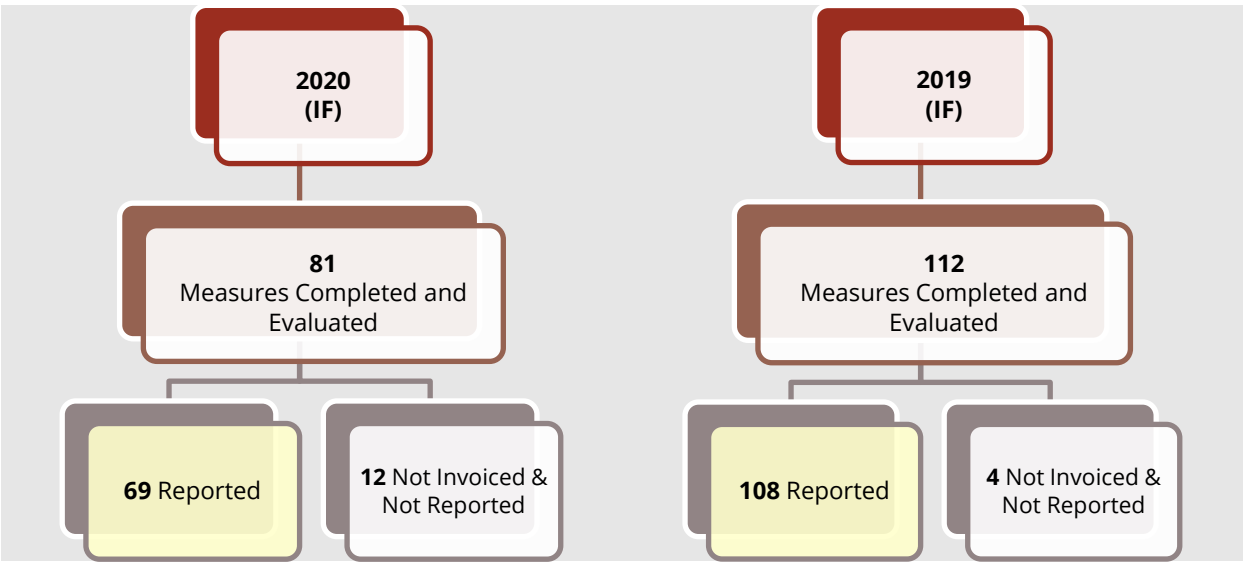
Methods used to conduct this evaluation include virtual inspections and measurement, engineering analysis, interval billing analysis, telephone surveys, documentation review, best practice review, and interviews with program participants and IESO-funded energy managers. This section explains the evaluation approach in more detail, including the overall sample design and basic descriptions of the methods applied.

EcoMetric's focus for the evaluation of the EM program is the non-incented projects completed by the energy managers. The sample frame for the PY2020 impact evaluation was all participating organizations with reported kWh savings in the implemented program tracking data on April 1st, 2021. EcoMetric used the energy manager as the sampling unit for the non-incented EM program gross and net impact evaluation resulting in a large evaluation sample of non-incented measures. For each sampled energy manager, EcoMetric reviewed all completed non-incented measures with reported kWh savings—both those that received a technical review and ones that did not receive a technical review. The technically reviewed measures accounted for 79% of the first-year energy savings in the sample frame, and the measures that did not receive a technical review accounted for the remaining 21% of the reported energy savings in the sample.

Seventeen energy managers completed non-incented projects in PY2019 and PY2020, totaling 193 individual measures. Eighty-one of these measures were implemented in PY2020, and 112 were implemented in PY2019. EcoMetric included all non-incented measures for 15 energy managers in this report because they have been invoiced to the IESO. Completing the invoicing process for a project is a requirement for savings to be reported. Due to the transition into the Interim Framework beginning in April 2019, no projects were ready for impact evaluation in the PY2019 evaluation cycle. These projects from PY2020 and PY2019 included in this report are collectively referred to as the PY2020 sample frame. Figure 1 shows how the EM sample frame comprises projects from PY2019 and PY2020.

Non-incented measures evaluated and reported in PY2020 include lighting retrofits, lighting controls and scheduling, mining operation upgrades, pump variable frequency drives, compressed air, HVAC, building automation systems, optimization, operation, and maintenance measures, among others.

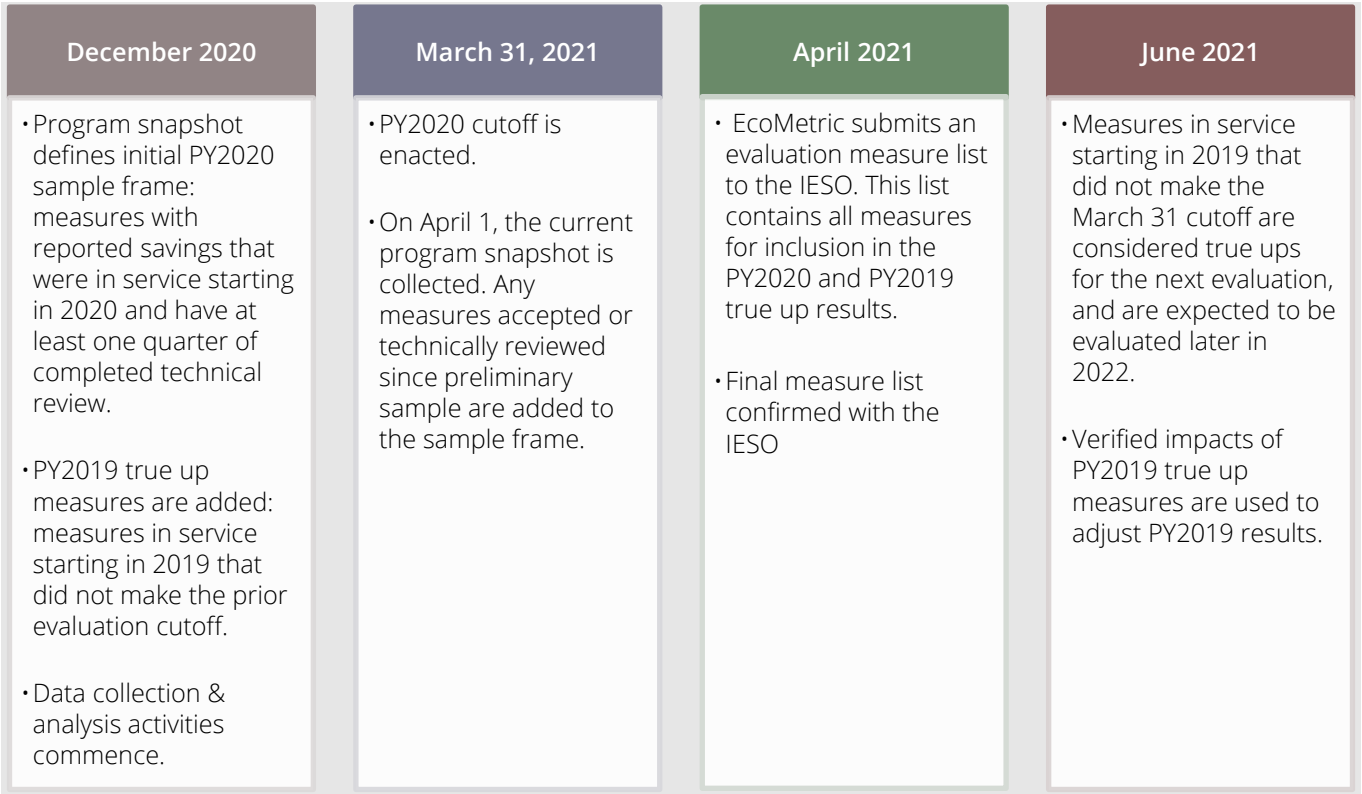
Figure 1: PY2020 EM Non-Incented Sample Frame



2.1.1 SAMPLING APPROACH

EcoMetric conducted a census of all measures for the EM non-incented program. Historically, we designed the evaluation as a 90/10 sample due to the high number of non-incented measures implemented in the program. However, due to the lower number of measures ready for evaluation in PY2020, EcoMetric conducted a census of all non-incented measures since the beginning of the IF. Figure 2 illustrates the process of defining the PY2020 sample frame for the EM non-incented program.

Figure 2: EM Non-Incented Sampling Process



2.2 IMPACT METHODOLOGY

2.2.1 DATA COLLECTION

The primary data source for non-incented Energy Manager projects in the gross impact evaluation sample was the program tracking data, calculation workbooks, and other supporting documentation submitted by the participating organization's energy manager. This information was supplemented with interviews and supplemental data requests to the energy managers in the sample. No site inspections were conducted for the PY2020 evaluation due to COVID-19 restrictions, but several "virtual" inspections were conducted via smartphone video application.

The IESO retains an independent contractor to perform technical reviews of a subset of non-incented savings claims and track the progress of energy managers towards their goals. The independent contractor or technical reviewer reviews projects corresponding to at least 30% of the savings from non-incented projects submitted by each energy manager annually and typically focuses their reviews on projects with the largest energy savings. For projects receiving a technical review, the technical reviewer's calculations, notes, and adjustments were key inputs as they are the source of the reported savings estimates. EcoMetric also reviewed the quarterly and annual term reports

prepared by the technical reviewer for each sampled participant. The intent of this initial review is to gain a detailed understanding of each upgrade and how it saves the facility energy.

For projects that were not technically reviewed, supporting calculations and documentation were requested directly from the energy managers when not available from the technical reviewer. In several cases, supporting documentation from the technical reviewer was not available until very late in the evaluation period. Further, when EcoMetric requested that energy managers provide missing supporting documentation, many energy managers expressed that the documentation had already been supplied to the technical reviewer.

For certain projects, further investigation involved an email exchange, phone discussion, and/or virtual onsite inspection with the energy manager for the project. The purpose of these interactions was typically to clarify EcoMetric's understanding of the approach and assumptions used to calculate reported savings, as well as to inquire about additional documentation that was deemed necessary to perform verified savings calculations. The virtual onsite inspections involved connecting with a facility representative via a video call application.

2.2.2 GROSS SAVINGS VERIFICATION

EcoMetric performed energy and peak demand savings analyses for all non-incented measures. Energy savings were annualized, regardless of the time-of-year or duration of measured data available. EcoMetric calculated energy and peak demand realization rates, the ratio of gross verified savings to reported savings, at the program-level for all sampled measures. EcoMetric applied these program-level realization rates to the reported savings for all non-incented measures evaluated and reported in PY2020.

More detailed descriptions of the gross savings verification methodology are included in Appendix A.

2.2.3 NET SAVINGS ANALYSIS

EcoMetric calculated net savings and net-to-gross (NTG) ratios to incorporate free ridership factors for the projects evaluated. NTG is the process of determining what portion of project savings is attributable to the influence of the IESO programs versus what the customer would have done in the absence of incentive programs. The calculation of NTG factors typically includes both free ridership, defined as the savings customers would have achieved in the absence of the program's influence (commonly called the counterfactual condition), and spillover, defined as savings influenced by the program but not formally incentivized or claimed by the program.

The approach for PY2020 continues to utilize the enhancements made to the NTG questionnaire for the Conservation First Framework (CFF) evaluation. Results from the prior NTG spillover assessments

from PY2013 through PY2017 sites did not identify any spillover attributable to any of the programs in the industrial portfolio, so the team did not assess participant spillover for PY2020. As in the past, the basis of free ridership analysis for the IESO's industrial programs was direct query (interviews with past participants) about the theoretical counterfactual condition. This method is considered best practice for programs with large savings per project, unique applications, and low participant counts. Greater detail on net savings methodology is included in Appendix A.

2.2.4 SUMMER PEAK DEMAND ANALYSIS

EcoMetric verified summer coincident peak demand impacts for each project based on the IESO-defined peak periods summarized in Table 5. High-resolution energy savings load shapes, vital for calculating on-peak demand savings, were developed for each project as possible and used to account for the seasonal, daily, and hourly variations in operating schedules and energy consumption. When project documentation did not include sufficient data to develop load shapes, EcoMetric leveraged existing load shapes contained in the IESO's Conservation and Demand Management Energy Efficiency Cost Effectiveness Tool based on the best fit for project and facility type.

Table 5: IESO EM&V Protocol Peak Period Definitions

Definition Source	Months	Days and Hours	Calculation of Demand Savings
EM&V Protocols: Standard Peak Calculation	Summer: Jun-Aug	Weekdays 1pm-7pm	Average over entire peak period
EM&V Protocols: Standard Peak Calculation	Winter: Jan-Dec	Weekdays 6pm-8pm	Average over entire peak period
EM&V Protocols: Alternative Peak Protocols for Weather-Dependent Measures	Summer: Jun-Aug	Weekdays 1pm-7pm	Weighted average of the top hour in each of 3 months per IESO weights
EM&V Protocols: Alternative Peak Protocols for Weather-Dependent Measures	Winter: Jan-Dec	Weekdays 6pm-8pm	Weighted average of the top hour in each of 3 months per IESO weights

2.2.5 AVOIDED GREENHOUSE GAS EMISSIONS ESTIMATION

EcoMetric estimated net greenhouse gas (GHG) impacts for each project by utilizing measure-level energy savings load shapes based on metered data and emissions factors (EFs) provided by the IESO at the annual and hourly level and aggregated to the eight IESO peak periods as defined in the IESO's Conservation and Demand Management Energy Efficiency Cost Effectiveness Tool.

2.2.6 COST EFFECTIVENESS ANALYSIS

EcoMetric used the IESO Conservation and Demand Management (CDM) Cost-Effectiveness Tool to estimate measure-level costs and benefits, aggregated to program- and portfolio-level cost effectiveness. Program administrative costs were provided to EcoMetric by the IESO. Other key inputs for the cost effectiveness analysis include lifetime electric energy and demand savings, measure lives, energy savings load shapes, and incremental project costs.

EcoMetric states benefits and costs in present value terms, using the appropriate discount and inflation rates conforming to the IESO's requirements outlined in the IESO CDM Cost-Effectiveness Guide.

2.2.7 JOB IMPACTS ESTIMATION

EcoMetric leveraged the Statistics Canada (StatCan) custom input / output (I/O) economic model to estimate the job impacts of the EM program. The StatCan I/O model simulates the economic and employment impacts of economic activity related to the program. The economic activity related to the EM program was leveraged as "shocks", which act as inputs into the model to show the direct, indirect, and induced impacts on the number of jobs created by the program. The I/O model uses regional and national multipliers to estimate the economy-wide effects of the economic activity induced by the program. The I/O model used three shocks to determine job impacts of the EM program:

- Demand for goods and services related to the program
- Business reinvestment
- Program funding

The demand for goods and services related to the EM program shock represents the spending on goods and services to participate in the program. This includes spending on capital measures, hiring contractors and consultants, all labour costs related to program participation, and the administrative costs for the IESO. EcoMetric derived the value of this shock from the estimated project costs for each project.

The business reinvestment shock represents the amount of savings from reduced energy bills that the participants reinvest in the local economy. The portion of project costs not covered by IESO incentives was deducted from the total bill savings for each facility. EcoMetric calculated the energy bill savings using the net energy savings from the impact evaluation and the IESO's electricity retail rates. As for the amount of reinvestment, the team collected primary data from the participants through the process and NTG interviews. EcoMetric asked participants what percentage of their bill savings they plan on reinvesting.

Finally, the program funding shock represents the incremental increase in electricity bills in Ontario's residential sector used to fund the program. EcoMetric sourced the EM program budget data from the IESO, as well as the assumption of the share of the residential sector's funding portion of the program.

2.3 PROCESS EVALUATION METHODOLOGY

Several completed data collection activities informed the current process evaluation. These activities are summarized in Table 6. This report documents findings from the data collection activities, including 1) the energy manager interviews and 2) the program participant survey.

Table 6: Energy Manager Process Interview and Survey Counts

Interview or Survey Group	Method	Population	Target Sample	Description of Contacts
Energy Managers	In-depth interview (IDI, over the phone)	53[2]	15	IESO-funded energy managers under contract in the Interim Framework
EM Participant Survey (joint with NTG)	Mixed-mode survey (Online and over the phone)	18	Census	Participating organizations that enroll in the Energy Manager Program

2.3.1 DOCUMENT AND DATA REVIEW

EcoMetric reviewed the program documents associated with the redesign and the transition, including the business case, the revised rules document, any other revised documents (such as the

[2] Includes all energy managers with a contract date in the IESO's IF EM Tracker database accessed on June 10, 2021.

application and customer agreement), presentation and training materials, and any other relevant documents. This activity confirmed our knowledge of and identified any changes to program processes and rules and guided interview guide and survey development.

2.3.2 PARTICIPANT SURVEY

EcoMetric conducted participant surveys for this evaluation. This survey combined process and NTG questions. To address process evaluation objectives, the team asked participants about:

- Assess motivations for participating in the Energy Manager Program
- Assess participant experience, including satisfaction with program services (support, incentives, savings requirements, and reporting)
- Determine if participants follow section 3(d) of the participant contract, which stipulates that an energy manager must be a new employee or, if an existing employee, the prior position of that employee must be fulfilled by another staff
- If under-performing (not achieving energy savings or performance goal), what might be the reason for not meeting the performance goal
- Assess types of actions participants implemented because of program participation, what is stopping them from doing more, and the decision-making process to proceed with an upgrade under consideration
- Assess cross participation with other IESO programs
- Investigate SEM readiness and necessary support to continue unfunded energy manager positions
- Identify suggestions for improvement of the Energy Manager program

2.3.3 ENERGY MANAGER INTERVIEWS

EcoMetric conducted in-depth interviews with 15 active IF energy managers, including those participating in the Natural Resources Canada (NRCan) and Enbridge collaborations. Information about these collaborations is provided in Section 4.6. Energy managers were randomly chosen from the three strata of energy manager types: traditional IESO-funded, Enbridge collaboration, and NRCan Collaboration.

Table 7 summarizes the energy manager in-depth interview sample frame.

Table 7: Energy Manager In-Depth Interview Count

Energy Manager Type	Number of In-Depth Interviews	Participating Organization Types
IESO-funded	7	Commercial Real Estate, Institutional, Manufacturing, Mining
Enbridge Collaboration	5	Healthcare, University
NRCan Collaboration	3	Brewery, Food Supply, Logistics and Transportation

EcoMetric conducted in-depth interviews with the energy managers over the phone, which lasted an average of about 45 minutes. The in-depth interviews focused on the energy managers' overall experience with the program and their holistic impacts on the participating organizations they work with. EcoMetric asked energy managers about:

- Satisfaction with Energy Manager Support Services (EMSS), IESO support, program requirements, and observed energy savings
- Reasons for dissatisfaction if any
- Suggestions for improvement
- M&V processes for incented versus non-incented projects
- M&V capabilities including energy modeling, familiarity with RETScreen
- Balancing electricity and gas savings
- Perceived value and impacts in the participating organization
- Impacts beyond kWh and kW savings reported as incented or non-incented measures
- Support the IESO can provide to energy managers to enhance their impact within the participating organization and make a business case to fund their own energy manager.

3 IMPACT EVALUATION

This section details the results from the impact evaluation of the EM non-incented program in PY2020.

3.1 GROSS VERIFIED SAVINGS RESULTS

Gross verified savings results for the PY2020 Energy Manager non-incented program are summarized in Table 8. The total gross verified energy savings for the EM non-incented program in PY2020 are 6,463 MWh, representing almost 100% of reported savings. True up projects from PY2019 totaled 10,969 MWh of gross verified energy savings, also representing almost 100% of reported savings. When combined, the total gross verified energy savings for PY2020 and PY2019 true up projects are 17,432 MWh—nearly 100% of reported savings. Total gross verified summer peak demand savings for the EM non-incented program are 2.69 MW, representing 105% of total reported savings.

Table 8: PY2020 EM Non-Incented Gross Verified Savings Results

Program Year	Projects Evaluated	Energy Realization Rate (%)	Gross Energy Savings (MWh)	Gross 2022 Energy Savings (MWh)	Peak Demand Realization Rate (%)	Gross Summer Peak Demand Savings (MW)	Gross 2022 Summer Peak Demand Savings (MW)
2020	69	100%	6,463	4,555	105%	1.02	0.81
2019 True Ups	108	100%	10,969	6,057	105%	1.67	0.68
TOTAL	**177**	**100%**	**17,432**	**10,612**	**105%**	**2.69**	**1.49**

Sixty-one percent of the energy savings achieved by the PY2020 sample frame persist to 2022. Non-incented projects implemented by energy managers commonly include behavioural and O&M measures, which have a shorter persistence than equipment retrofit projects.

While EcoMetric applied the program-level realization rates to all non-incented measures evaluated and reported in PY2020, individual project energy realization rates ranged between 63% and 112%. Peak demand realization rates ranged between 88% and 387%.

Finding #1: The technical review process was disorganized, and the robustness of the reviews was inconsistent. The first step of the impact evaluation process was to gather supporting documentation and calculation files for non-incented measures that received a technical review. Acquiring the files from the technical reviewer proved to be slow and incomplete. In several cases, the evaluation team had to ask energy managers to

resubmit files that the technical reviewer could not locate. Supporting documentation for many of the smaller projects was inadequate to determine how savings were calculated and reviewed. Many of the technical review analyses were well documented and followed industry-standard methods. Around 15% of analyses were rudimentary and failed to correct basic mistakes in energy manager savings calculations. For one project, the peak demand savings estimate was the power draw of the equipment post-retrofit instead of the reduction in peak demand associated with the measure.

Recommendation #1: Encourage better documentation from the energy managers. In the EM Quarterly Report Excel workbooks, details on how the baseline and post-project conditions were quantified and how annualized electricity savings were estimated were commonly minimal (e.g., simple statements such as "Used RETScreen" were provided). Other workbooks referenced specific names of files that presumably contained the savings calculations used to determine reported savings values but were not included with project documentation. At the very least, project documentation should include the spreadsheet analyses used to calculate energy and peak demand savings for each project.

Recommendation #2: Increase the level of detail for non-incented project documentation for projects estimated to achieve less than 100 MWh/year. Provide energy managers with clearer guidelines on the type of information required to accurately verify the savings for common measure types. Projects estimated to achieve less than 100 MWh/year accounted for 155 out of 177 projects evaluated in PY2020—representing 33% of reported electric energy savings for the program.

Finding #2: Most projects assumed that energy consumption was unaffected by the COVID-19 pandemic. Several energy managers implemented optimization measures in March 2020 to modify the lighting and HVAC schedules of buildings. These measures were analyzed using IPMVP Option C regression models in RETScreen using pre-pandemic consumption data as the baseline. Energy and peak demand savings were calculated using consumption data from March 2020 onward when varying levels of COVID-19 restrictions were in place. The energy manager and technical reviewer clearly documented the implicit assumption that building operation (occupancy, hours of operation) did not change due to the COVID-19 pandemic, which is not always accurate as the effects of the pandemic are far-reaching and complex and the effect on organizations varied widely by industry.

Recommendation #3: Expect consistency from energy managers and technical reviewers with respect to adjustments for Non-Routine Events (NREs) such as the COVID-19 pandemic. Adjustments for NREs can be achieved by normalizing the data across pandemic-impacted periods or extending baseline and performance periods to include "normal" operations.

Finding #3: The PY2020 non-incented projects generally showed improved attention to detail in the peak demand savings calculations. In prior years, EcoMetric often found peak demand savings values set to missing or zero in the program tracking data. In other cases, the peak demand savings would be the change in connected load without consideration of coincidence. One project involved a retrocommissioning measure for which no summer peak demand savings were calculated. EcoMetric estimated the peak demand savings based on the verified energy savings and the IESO load shape for the most appropriate facility type.

Recommendation #4: Energy managers should strive to estimate peak demand savings for all projects, regardless of the measure type, availability, or timing of performance data.

Finding #4: Energy savings estimates were not always annualized. The claimed savings for several of the measures in our evaluation sample were based on observed savings over a subset of the year. In most cases, this was driven by data availability and the timing of an Energy Manager's annual review.

Recommendation #5: Energy managers and technical reviewers should attempt to estimate the energy savings over a full year, regardless of the time-of-year or duration of measurement data.

Finding #5: Documentation for a lighting scheduling measure within one project did not include information about the fixtures involved (i.e., wattages or quantities). This essentially prevented EcoMetric from performing a full energy savings analysis for the measure.

Recommendation #6: Project documentation should always include, at a minimum, information related to essential inputs to savings calculations. Ideally, project documentation should also include a clear and logical explanation for how the ex-ante savings were calculated and a rationale for any assumptions involved.

Finding #6: Many projects were umbrella projects that covered three or four smaller projects, each relating to a different technology at the same location. One project, for example, involved an LED lighting upgrade, HVAC upgrades, and occupancy ventilation control. These types of projects create difficulties in verifying savings and determining proper in-service dates and expected useful lives when several smaller projects are combined into one.

Recommendation #7: If feasible, projects with multiple measures should truly be three different projects, each with its own description, savings calculations, in-service date, and expected useful life. If premise-level meter data is used to estimate savings in such cases, energy managers should estimate

the premise-level savings first, then distribute the total savings between the projects based on assumptions about the relative impact of each project.

3.2 NET VERIFIED SAVINGS RESULTS

Table 9 summarizes the EM non-incented net savings below. The program-level NTG for the EM non-incented measures was 91% for the PY2020 projects, reflecting a free ridership score of 9%. Spillover was not assessed for the program as part of this evaluation. Total net first-year savings for non-incented EM projects evaluated in PY2020 was 15,863 MWh, and net peak demand savings were 2.45 MW.

Energy managers were perceived by customers as key players in project identification, analysis, and documentation. While in a few cases, the customers indicated they would likely have pursued the projects in question regardless of whether they had an energy manager. In most cases, the interviewees felt that energy managers were instrumental in identifying feasible projects, speeding up project implementation, and ensuring that all required documentation and savings estimates were accounted for.

Table 9: PY2020 EM Non-Incented Net Verified Savings Results

Program Year	Projects Evaluated & Reported	NTG Ratio	Net Energy Savings (MWh)	Net 2022 Energy Savings (MWh)	Net Summer Peak Demand Savings (MW)	Net 2022 Summer Peak Demand Savings (MW)
2020	69	91%	5,882	4,145	0.93	0.75
2019 True Ups	108	91%	9,981	5,511	1.53	0.62
TOTAL	**177**	**91%**	**15,863**	**9,657**	**2.45**	**1.36**

3.2.1 SAVINGS PERSISTENCE

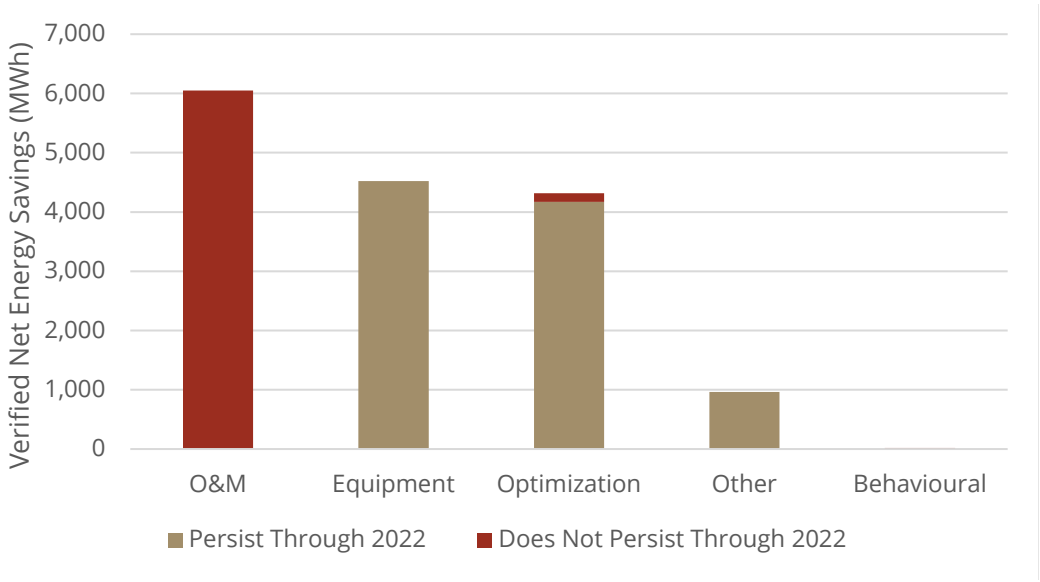
The policy decision to assess progress towards Interim Framework goals via the measurement of 2022 persistence savings places a lot of importance on the estimated measure life of non-incented Energy Manager projects. Measuring goals via persistent savings is designed to encourage the implementation of long-lasting measures but can also present challenges to programs like EM, where much of the non-incented savings come from short-lived behavioural and O&M measures.

Figure 3 depicts the share of first-year net energy savings that persist through 2022 across the PY2020 EM sample frame. Overall, 61% of EM energy savings persist through 2022, and the other 39% will expire before the end of 2022. O&M measures account for 38% of the EM non-incented program's net energy savings. However, less than 1% of these savings persist through 2022. Several

large lighting scheduling projects achieved high levels of first-year energy savings in PY2019, but their effective useful lives of three years or less do not persist through 2022.

The equipment retrofit, optimization, and "other" measure types account for 62% of the program's first-year net energy savings, and 99% of those savings persist through 2022. Equipment retrofits commonly implemented in the non-incented program include lighting, HVAC units, fans, and pumps, which have effective and useful lives ranging from 6 to 15 years. Well executed optimization projects can also have long, effective useful lives up to 10 to 12 years.

Figure 3: EM Non-Incented Measure Persistence through 2022



Finding #7: Overall, 61% of EM non-incented energy savings persist through 2022, and the other 39% will expire before the end of 2022.

3.3 AVOIDED GREENHOUSE GAS EMISSIONS

Net first year greenhouse gas (GHG) reductions total 1,712 metric tonnes of CO_2 equivalent (CO_2e) for the PY2020 sample frame, as summarized in Table 10. As EM non-incented projects focus on electricity savings, these GHG reductions are derived from the avoided generation of electricity. Over the lifetime of the PY2020 sample frame projects, net GHG reductions total 12,218 tonnes of CO_2e.

For the PY2020 sample frame, the cost of first year GHG emissions reductions is $2,875 per tonne of CO_2e from the total resource cost perspective. Emissions reductions costs for the EM non-incented program benefit from the prevalence of low-cost, no-cost O&M measures.

Table 10: PY2020 EM Non-Incented Greenhouse Gas Emissions Impacts

Program Year	First Year GHG Impacts (tonnes CO_2e)	First Year GHG Reduction Costs ($/tonne CO_2e) (Total Resource Costs)
2020	629	$6,146
2019 True Ups	1,083	$974
Total	**1,712**	**$2,875**

3.4 COST EFFECTIVENESS RESULTS

As shown in Table 11, the EM non-incented program is not cost effective from the TRC test perspective using a benefit/cost threshold of 1.0[3]. From the TRC perspective, benefits totaled $2,106,408 while costs totaled $3,867,573. However, the EM non-incented program is cost effective from the PAC test perspective. The cost effectiveness of the program in PY2020 was negatively affected by the COVID-19 pandemic as fewer projects were implemented, and more administrative support and guidance for the participants under contract were required of the IESO and technical reviewers. Further, the full cost of the energy managers' salaries and administrative costs related to marketing and training of energy managers is included in the cost effectiveness of the EM non-incented program. Energy managers' main focus is to identify and implement projects through the IESO's incented programs, such as Business Retrofit and PSUP.

Table 11: PY2020 EM Non-Incented Cost Effectiveness Results

TRC Costs	TRC Benefits	TRC Ratio	PAC Costs	PAC Benefits	PAC Ratio	LC $/kWh
$3,867,573	$2,106,408	**0.54**	$1,323,056	$1,831,659	**1.38**	0.04

As energy managers drive projects in several incented IESO programs, their salaries and administrative spending by the IESO related to outreach and training of energy managers should be spread out amongst the cost effectiveness analyses of the programs they participate in. As summarized in Section 4.2.1, 27% of the electric energy savings achieved by energy managers in PY2020 was through non-incented projects. Meanwhile, 72% of energy managers' savings in PY2020 were achieved through the Business Retrofit program, and 1% was from PSUP. Table 12 summarizes the PY2020 cost effectiveness results for the Energy Manager non-incented program where 27% of

[3] The EM non-incented cost effectiveness analysis for PY2020 only includes projects implemented in calendar year 2020.

the energy managers' salaries and administrative costs are included—corresponding to the 27% electric energy savings achieved through non-incented measures by the energy managers that year. With the costs associated with energy managers distributed based on the amount of savings achieved through the non-incented program path, the TRC ratio increases to 0.73, and the PAC ratio increases to 5.13. Following this methodology, the cost effectiveness of the Business Retrofit and PSUP programs would also be affected as their costs increase, but the energy manager impact on these programs in terms of savings and costs is small, and the results would not dramatically change.

Table 12: PY2020 EM Non-Incented Alternative Cost Effectiveness Results

TRC Costs	TRC Benefits	TRC Ratio	PAC Costs	PAC Benefits	PAC Ratio	LC $/kWh
$2,901,589	$2,106,408	**0.73**	$357,071	$1,831,659	**5.13**	0.01

Finding #8: The full cost of energy manager salaries and administrative spending related to outreach and training of energy managers is included in the cost effectiveness analysis of the EM non-incented program. While the full costs of delivering the EM program are included in the cost effectiveness analysis, only the benefits from non-incented measure savings are included. EM contracts require that only 10% of the savings goal must be through non-incented improvements.

Recommendation #8: Salaries paid to energy managers and administrative spending related to the outreach and training of energy managers should be distributed amongst the programs the energy managers are achieving savings.

4 PROCESS EVALUATION RESULTS

4.1 FINDINGS AND RECOMMENDATIONS FROM PY2019 EVALUATION

EcoMetric conducted a process evaluation of the Energy Manager program in PY2019[4], completing several data collection activities, including in-depth interviews with IESO staff, EM Support Services staff, energy managers, and technical review staff. This process evaluation yielded several key findings and recommendations that the IESO considered while continuously working to improve the program.

Following the PY2019 evaluation, the IESO made the following program updates:

- Issued guidance to the market to manage the impact of the COVID-19 health emergency on ongoing measurement and verification reporting requirements for implemented projects
- Published savings calculation guidelines for non-incented projects and provided guidelines to active energy managers
- Streamlined application process by developing concise recommendation documents to be completed by technical reviewers as they review and approve applications
- Worked with EcoMetric to design a holistic impact evaluation that reports energy managers' impacts across the IESO's programs

4.2 ENERGY MANAGER HOLISTIC IMPACTS

4.2.1 ENERGY MANAGERS' SAVINGS IMPACTS ACROSS IESO PROGRAMS

While at least 10% of IESO-funded energy managers' energy savings goals should come from non-incented measures, the remaining 90% is achieved through IESO's incented programs such as Business Retrofit (Retrofit), and PSUP. Due to the wide range of eligible measures and relative ease of participation, most energy managers' incented energy savings come from measures implemented through the Business Retrofit program.

[4] PY2019 IESO Interim Framework Energy Manager Program Impact and Process Evaluation Report. https://www.ieso.ca/-/media/Files/IESO/Document-Library/conservation/EMV/2019/PY2019-Interim-Framework-EM-Program-Evaluation-Report.ashx

Table 13 summarizes the reported energy and demand savings participating energy managers were responsible for in the IF PY2020. Projects implemented by IESO-funded energy managers achieved 23,970 MWh of reported energy savings in PY2020, accounting for 11% of total energy savings across the IESO programs they participated in.

Energy managers achieved 17,208 MWh of reported energy savings in the PY2020 Retrofit program, accounting for 8% of the program's total savings. Energy managers also contributed 5.64 MW reported summer peak demand savings—16% of the Retrofit program's total in PY2020. In PSUP, energy managers accounted for 299 MWh of reported energy savings—9% of the program total in PY2020.

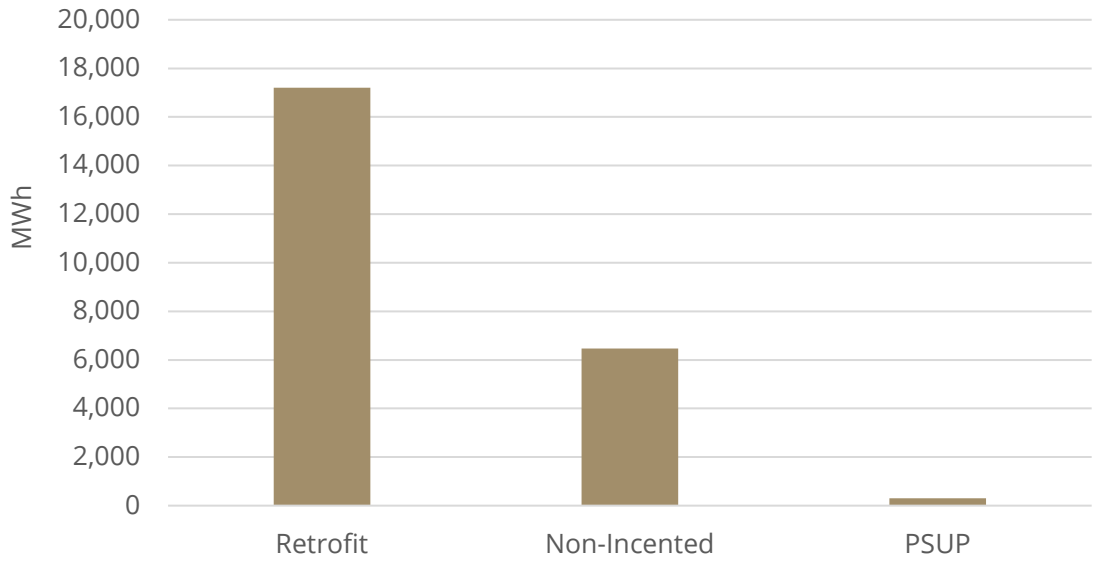
Table 13: Energy Manager Savings in PY2020 IESO Programs

Program	Energy Manager Reported Energy Savings (MWh)	Percent of Total PY2020 Program Energy Savings	Energy Manager Reported Summer Peak Demand Savings (MW)	Percent of Total PY2020 Program Demand Savings
Retrofit	17,208	8%	5.64	16%
EM Non-Incented	6,469	100%	0.97	100%
PSUP	299	9%	-	NA
Total	**23,970**	**11%**	**6.61**	**18%**

Figure 4 summarizes the reported energy savings achieved by participating energy managers across the IESO programs in PY2020. Seventy two percent of participating energy managers' reported energy savings in PY2020 were achieved through the Retrofit program, followed by 27% through non-incented measures and 1% through PSUP. There are energy managers active in the EPP program, but no facilities were ready for evaluation and reporting at the time of this report.

While only one project in PSUP PY2020 was implemented by a participating energy manager, just three total PY2020 projects were reported this year. Similar to the EM program, participation and the implementation of PSUP projects were negatively affected by the COVID-19 pandemic throughout 2020. However, participating energy managers have a strong pipeline of PSUP projects and engineering studies yet to be completed in the IF. There are currently five engineering studies and 34 PSUP projects under contract in the IF for organizations with IESO-funded energy managers.

Figure 4: PY2020 Energy Manager Reported Energy Savings by IESO Program (MWh)



EcoMetric also asked participants what other IESO programs they have participated in to assess the level of cross-program interaction in the IESO's portfolio. Table 14 outlines that other IESO programs are being utilized by the Energy Manager program participants. The count of responses represents a participant saying they have participated in the IESO program, and the proportion represents the count per program divided by the overall count of all participants' responses. This supports the portfolio savings data outlined above and suggests that the Energy Manager program is effective in driving energy efficiency projects to the Retrofit and PSUP pipelines.

Table 14: IESO Program Interaction

IESO Program	Count of Responses	Proportion
Business Retrofit Program	11	37%
Process and Systems Upgrade Program (PSUP)	6	20%
Other	3	10%
Energy Performance Program (EPP)	3	10%
Small Business Lighting Program	2	7%
Certified Energy Auditor Certification Program	1	3%
Load Shedding Program	1	3%
Don't know	3	10%

Finding #9: The impact of IESO-funded energy managers on the IESO savings goals goes far beyond the non-incented measures detailed in this report. IESO-funded energy managers were responsible for 23,970 MWh reported energy savings in PY2020,

accounting for 11% of total reported energy savings across the Business Retrofit, PSUP, and EM non-incented programs. Organizations with IESO-funded energy managers also have 34 PSUP projects under contract that are not yet in service, so their share of IESO portfolio savings is expected to greatly increase in the next evaluation reports.

Finding #10: Energy managers implemented much larger projects, on average, than the general population in the Business Retrofit program. Retrofit projects led by IESO energy managers averaged 103,911 kWh of annual savings, compared to 60,609 kWh for the rest of the program.

Recommendation #9: Develop a Reporting Template to track the verified savings achieved from projects implemented by IESO-funded energy managers across IESO programs.

4.2.2 ENERGY MANAGERS' VALUE

Surveyed participants indicated the greatest benefit of having an energy manager is having a dedicated resource to focus on energy management and drive project implementation. Other benefits noted by respondents were energy and cost savings followed by greater employee engagement in energy and sustainability efforts as well as adding technical expertise to their organization. Table 15 illustrates the benefits highlighted by surveyed participants.

Table 15: Benefits of Having an Energy Manager (n=16)

Benefits	Count of Responses	Proportion
Dedicated resource to focus on energy management and drive projects	16	62%
Energy and cost savings	5	19%
Greater employee engagement in energy/sustainability efforts	3	12%
Gain technical expertise	2	8%

Finding #11: Program participants see energy managers as a valuable resource to focus on energy management and drive the implementation of projects.

Recommendation #10: Consider highlighting the perceived value of energy managers to industrial participants to encourage them to take ownership of holistic energy management in their organizations.

EcoMetric asked the energy managers if they believe that their efforts to identify and implement energy efficiency projects have resulted in changes in the way their organization operates. Fourteen of the 15 energy managers answered that yes, they do believe they have changed how their

organization operates. When asked how their organizations have changed, we received many different responses, including:

- Energy efficiency is now part of the company's planning process
- Maintenance practices are now viewed from the energy efficiency perspective
- Greater commitment to reduce greenhouse gas emissions and energy costs
- Conducting more energy potential studies
- Improved energy data collection and analysis
- Installed more sub-metering to monitor energy use
- Developed corporate energy management and conservation plan
- Process-related and behavioural measures have been implemented to directly change how organization operates

Energy managers' value and impact on their organization go beyond the electric energy and demand savings reported in the IESO portfolio of programs. Eighty percent of the energy managers that EcoMetric interviewed actively try to identify water and fossil fuel savings at the organizations they operate in. We asked the energy managers how they prioritize projects to achieve electric, fossil fuel, and water savings. Their responses are summarized in Table 16. Five of the 14 energy managers that responded claimed that they prioritize greenhouse gas emissions reductions. These energy managers stated that the focus on greenhouse gas emissions reductions is mostly achieved through natural gas savings projects. Four of the energy managers use financial analysis and return on investment to prioritize energy savings projects regardless of the source. One energy manager, who works for a brewing company, stated that water was their highest priority.

Table 16: Energy Manager Savings Prioritization (n=14)

Project Prioritization	Count of Responses	Proportion
Prioritize greenhouse gas emissions	5	36%
Financial analysis	4	29%
No prioritization	1	7%
Prioritize water projects	1	7%
Ease of implementation	1	7%

Finding #12: The achievement of greenhouse gas emissions reductions and return on investment are important factors in the prioritization of energy-saving projects for energy managers. No energy manager mentioned electricity savings as a priority.

Recommendation #11: Consider providing information and case studies to energy managers on how electric energy efficiency projects can promote beneficial electrification strategies.

As energy managers focus on achieving savings across several fuel types, EcoMetric asked how the IESO could further identify all types of savings the energy managers achieve at their organizations. Energy managers provided a variety of responses to this question. Taken together, a theme of "more information" emerges—including support with calculation factors and more training, case studies, and reference materials.

Finding #13: Energy managers achieve savings across several fuel types, but only kWh and kW savings are reported by the IESO. Energy managers suggest that more information such as case studies and calculators would support the identification and reporting of all types of savings they achieve.

Recommendation #12: Develop case studies, training, calculators, and other reference materials to support energy managers in achieving, calculating, and reporting all savings in their organizations, including water and fossil fuels. Publish a measure substantiation sheet that includes fuel and water savings to be included with the IESO's Measures and Assumptions List (MAL).

Recommendation #13: Consider updating the Energy Manager Quarterly Submission document to include sheets for reporting water and fossil fuel savings achieved. Consider including water and fossil fuel impacts in the Energy Manager cost effectiveness calculations to provide a better review of the program.

4.3 PROGRAM EXPERIENCE AND UNDERSTANDING

4.3.1 PARTICIPANTS' PROGRAM EXPERIENCE AND UNDERSTANDING

EcoMetric asked the EM participants how they first heard about the program. Key roles at the IESO and the LDCs were noted as the most common. Table 17 shows the breakdown of how the participants heard about the program. These responses highlight the importance of having these dedicated one-to-one managers of these relationships.

Table 17: Program Awareness Method (n=17)

Introduction Method	Count of Responses	Proportion
IESO Business Development Manager	4	24%
LDC Key Account Manager	4	24%
Word of Mouth	3	18%
Prior Participation	2	12%
Internal	2	12%
Program marketing	1	6%
Other	1	6%

Finding #14: Surveyed participants indicated that the IESO Business Development Manager and the LDC Key Account Manager were the most prominent communication channels used to share Energy Manager program information with participants.

Surveyed participants indicated that their primary motivation for instituting an energy manager position at their facility is the potential for energy savings. The secondary motivation that participants expressed is the development of centralized oversight of energy management efforts. Table 18 shows the factors motivating participants to institute this position.

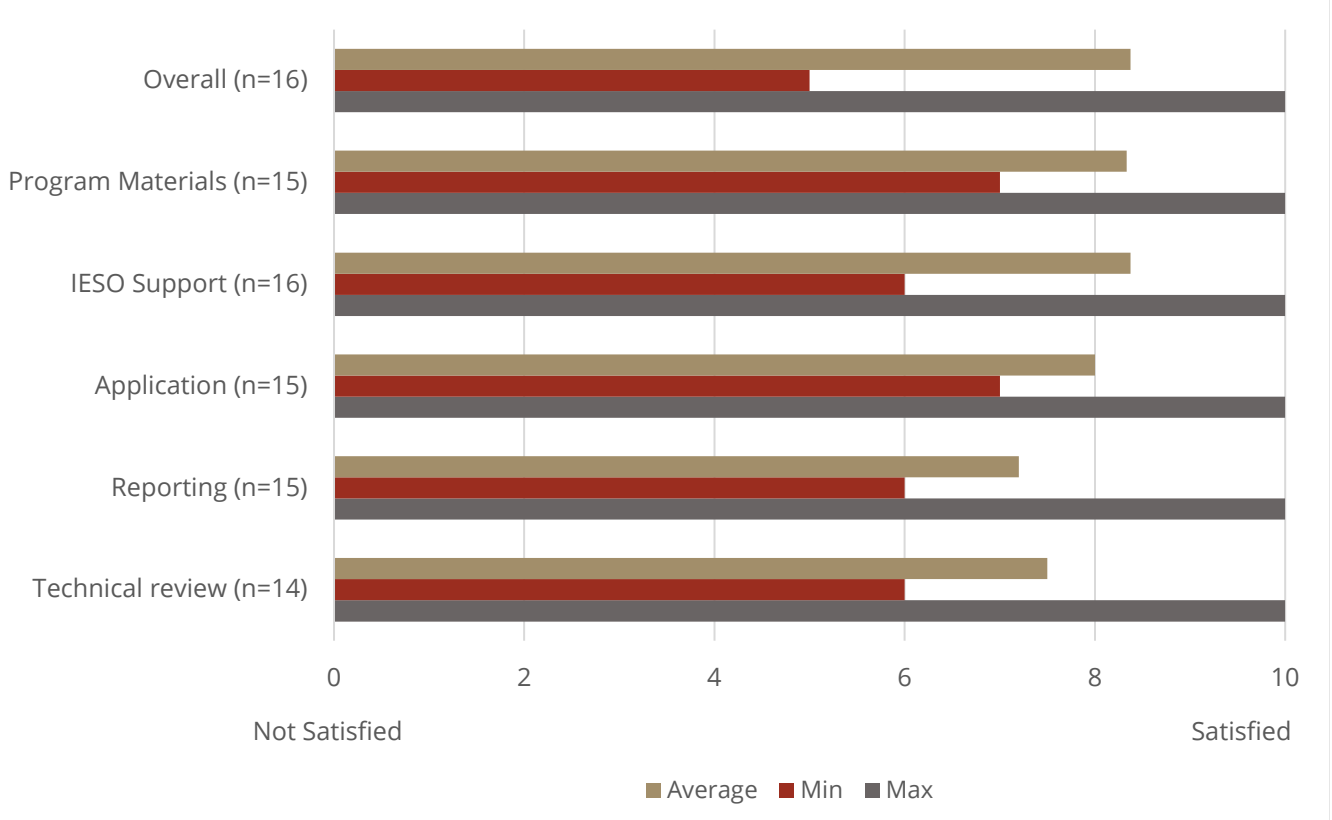
Table 18: Motivation for Energy Manager Position Initiation (n=17)

Motivation	Count of Responses	Proportion
Potential for energy savings	11	38%
Create centralized oversight of energy management efforts	7	24%
Funding	6	21%
Improve employee engagement in energy/sustainability efforts	3	10%
Gain expertise	2	7%

We asked participants if they were receiving sufficient information about other IESO programs from their EM or other IESO representatives, and 81% responded that they are receiving adequate information. Most respondents expressed moderate to high satisfaction with the program website and related program collateral, averaging a satisfaction score of 8.0.

Overall program satisfaction was high among respondents. We asked participants to rate their satisfaction across various elements of the program, with 1 being not satisfied and 10 being extremely satisfied. Figure 5 summarizes their responses.

Figure 5: Participants' Program Satisfaction



Participants were least satisfied with the reporting requirements to IESO and the technical review of energy savings resulting from the projects that the energy manager reports to IESO. These two components received the lowest average ratings among surveyed participants.

Finding #15: Overall program satisfaction was high among Energy Manager program participants. However, participants were least satisfied with reporting requirements and the technical review process. A common theme was related to the turnaround time it takes to receive feedback on the reports being very lengthy. Energy managers were also least satisfied with the reporting and technical review processes, as summarized in Finding #17.

Recommendation #14: Ensure IESO and technical review staff set clear expectations with participants regarding the review process and timeline to avoid participant frustration.

Recommendation #15: Coordinate with technical review staff to ensure there are set goals for technical review timelines.

Most participants noted moderate to high satisfaction with the program application process. Four respondents noted frustrations with the length of time it takes to receive payments. IESO should

investigate the specific causes for payment processing delays to ensure participants are receiving a payout in a timely manner.

Finding #16: Several participants expressed frustrations with the length of time it takes to receive program payments.

Recommendation #16: Consider noting estimated payout timelines in application materials and provide that to participants to manage their expectations in the future.

The IESO support category also received moderate to high scores; however, two respondents noted that the IESO provided little to no direct feedback on their performance in the program and that all of the communication is direct with the energy manager.

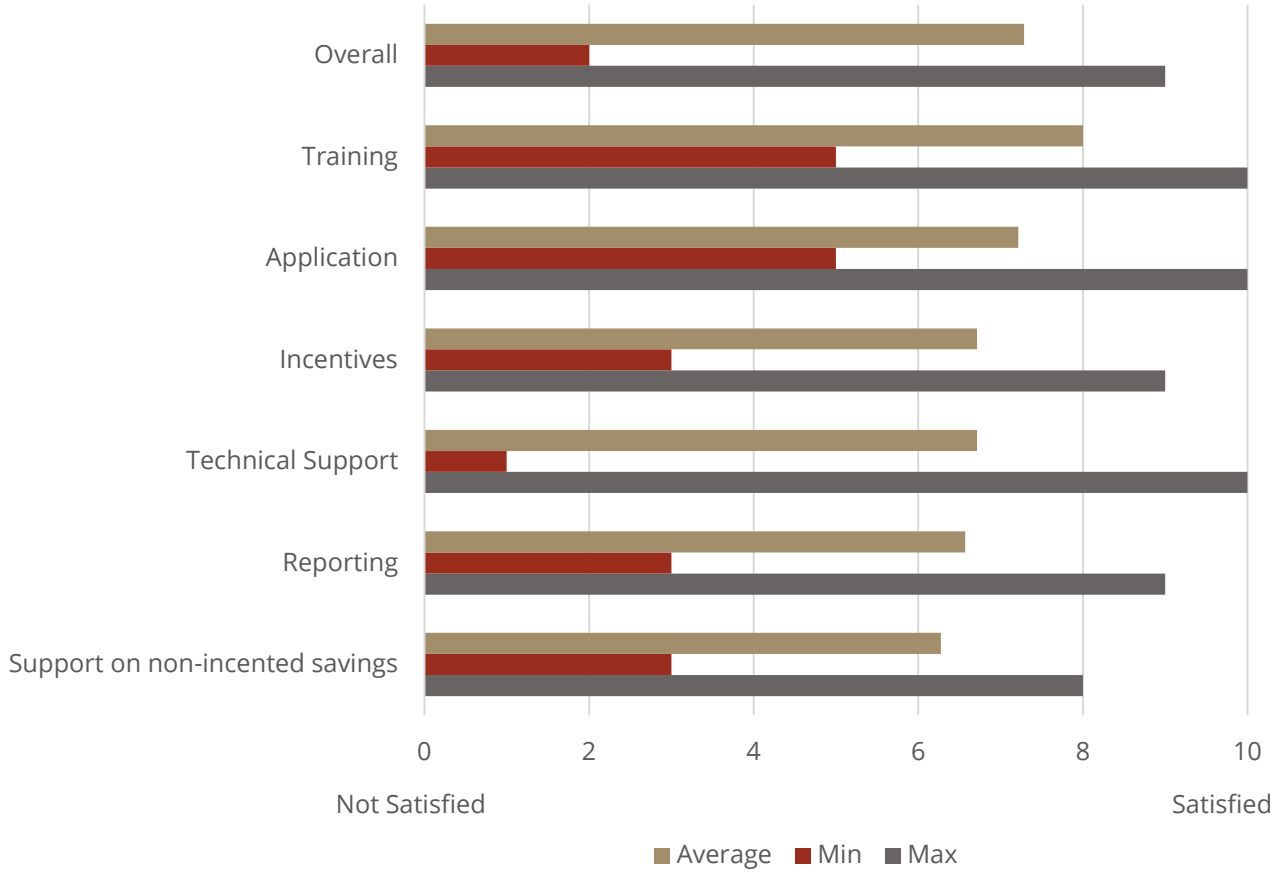
Respondents ranked their experience with the IESO reporting requirements with moderately high satisfaction. Among those who expressed dissatisfaction with the requirements, a common theme was the turnaround time it takes to receive feedback on the reports being very lengthy.

The technical review process received moderately high to high satisfaction scores from participants. Two respondents highlighted frustration related to the delays in receiving feedback from the technical reviewer and expressing that the process takes too long. One respondent noted that this links to the delayed incentive payout as well.

4.3.2 ENERGY MANAGERS' PROGRAM EXPERIENCE AND UNDERSTANDING

EcoMetric asked the energy managers to rate their satisfaction with the EM program and its various elements on a scale from 1 to 10, where 1 represents being not at all satisfied and 10 represents being extremely satisfied. Figure 6 summarizes their responses.

Figure 6: Energy Managers' Program Satisfaction (n=15)



The average satisfaction score for the overall program was 7.3. The energy managers that provided satisfaction scores of less than five for the overall program expressed frustration with the timeline required to have savings approved and the level of communication from the IESO and technical reviewers in comparison to when the program was delivered by Local Distribution Companies in the CFF. The average score for the overall program is down from the average of 8.75 from the PY2019 evaluation, although there were only four energy manager respondents.

Energy managers were most satisfied with the training offered by the IESO and technical reviewers, averaging a satisfaction score of 8.0. More information on the energy managers' utilization of training is provided in Section 4.5.1. The application process was the only other program element that received an average satisfaction score higher than seven. In PY2019, the satisfaction score for the application process also averaged just above seven. However, changes made by the IESO to streamline the application process after the PY2019 evaluation were not experienced by many respondents in PY2020 who had already applied to the program before the changes were made.

Energy managers were least satisfied with the support from the IESO and technical reviewers on non-incented project savings calculations. The energy managers who responded with satisfaction scores lower than 5 expressed that the back and forth during the technical review process was burdensome. Several energy managers expressed that non-incented savings are often difficult to explain and support in the quarterly submissions, and technical reviewers often do not understand or take into consideration the nuances of their specific facilities and operations. This is a persisting challenge for energy managers, as the support from the IESO and technical reviewers on non-incented project savings calculations was also the lowest on the satisfaction scale in the PY2019 evaluation.

As summarized in Table 19, the EM program met the expectations for nine of the 15 energy managers. Meanwhile, the program exceeded the expectations for four energy managers and did not meet expectations for two. These results align with the satisfaction scores, representing an overall moderate level of satisfaction for the energy managers.

Table 19: Energy Manager Program Expectations (n=15)

Expectations	Count of Responses
Exceed Expectations	4
Meet Expectations	9
Not Meet Expectations	2

Finding #17: Energy managers expressed moderate levels of satisfaction with the overall program. Energy managers are satisfied with training offered by the IESO and technical reviewers, but satisfaction declines once the energy managers actually have to calculate and report savings they achieve. Pain points include the support for non-incented project savings calculations, reporting requirements, and technical support.

Recommendation #17: Work to develop technical review and program support staff that are experts in common industries that participate in the EM program, such as manufacturing, mining, and universities. These industries have vastly different patterns in energy usage, facilities, and business needs which result in vastly different energy-saving projects and calculations. By developing experts to work with energy managers in specific industries, the savings calculation, reporting, and technical review process should be less burdensome as experts leverage lessons learned and commonalities from similar situations.

EcoMetric also asked the energy managers if they have a clear understanding of the program reporting requirements and responsibilities of the energy manager role. All 15 energy managers answered yes, signaling a clear understanding of the program requirements.

4.3.3 ENERGY SAVINGS GOALS AND IMPLEMENTATION CHALLENGES

When asked if their organization would achieve the required 1,000 MWh goal this participation year, 75% of participants indicated they would meet the required annual goal. For those who indicated that they would not reach the required savings goal, EcoMetric asked the participants what hindered their organization and energy manager from achieving this goal. Their responses to this follow up question are outlined in Table 21, with COVID-19 related impacts being noted as the primary reason for not attaining the required goal. While COVID-19 related impacts may be shorter term, other challenges noted like lack of funding should be taken under consideration by program staff. Ensuring that program participants and energy managers are aware of financing options and incentives available may help organizations overcome this barrier.

Table 20: Participant Hinderances to Reaching Annual Savings Goal (n=3)

Hinderance	Count of Responses	Proportion
COVID-19 related impacts	3	38%
Lack of funding for energy efficiency projects	2	25%
Equipment lead time	2	25%
Don't own facilities	1	13%

EcoMetric also asked participants if they experienced challenges in implementing the projects needed to meet annual savings goals. Seventy-five percent of surveyed participants noted that they did experience project implementation challenges. Participants noted that the main challenges they experienced in implementing these projects were installation delays (38%) and project approval/coordination (23%). Table 21 highlights the types of challenges experienced in the implementation of projects.

Table 21: Participant Project Implementation Challenges (n=12)

Project Implementation Challenges	Count of Responses	Proportion
Installation delays	5	38%
Project Coordination/Approval	3	23%
Access to upfront capital	2	15%
Covid-19	2	15%
Difficulty in setting up monitoring of energy savings of the installed equipment/upgrade	1	8%

Ninety-four percent of participants surveyed indicated that they would meet the 10% or 100 MWh annual non-incented project savings requirement this participation year.

While 88% of participants surveyed noted that they are aware of additional efficiency opportunities at their facility, lack of funding was the primary reason they have not moved forward with known project opportunities.

We also inquired about participating organizations' thresholds for implementing projects. As summarized in Table 22, four responses indicated that this was done on a case-by-case basis, while four others noted very clear payback requirements ranging from less than five years to 5 to 10-year simple payback.

Table 22: Participant Thresholds for Project Implementation (n=13)

Project Implementation Threshold	Count of Responses	Proportion
Case-by-case	4	29%
Client determined	3	21%
5 to 10 year simple payback	2	14%
<= 5 year payback	2	14%
16% Internal Rate of Return	1	7%
GHG Reduction per ton	1	7%
Must reduce energy consumption	1	7%

EcoMetric further asked the 15 active energy managers about the current challenges they face in implementing projects through the IESO's Save on Energy programs. Thirteen of the 15 energy managers have faced direct impacts on project implementation related to the COVID-19 pandemic. We also asked the energy managers to list the challenges they currently face in implementing both incented and non-incented projects. Their responses are summarized in Table 23.

Table 23: Energy Manager Project Implementation Challenges (n=13, multiple responses)

Project Implementation Challenges	Incented Projects Count of Responses	Non-Incented Projects Count of Responses
Budget	7	3
Scheduling and project timeline	3	2
Workforce capacity	2	2
Maintenance, repairs, health, and safety priorities over energy efficiency	2	1
Operational downtime	1	1
Lack of information and training	1	1
Corporate management buy-in	1	-

From the energy managers' perspective, the top challenge to implementing both incented and non-incented projects is the participating organization's budget. Project scheduling and workforce capacity were also common challenges to project implementation. These challenges align with the EM program participants' top challenges, which were installation delays and project approval.

We also asked the energy managers about their decision-making criteria when selecting which incented and non-incented projects to pursue and when to pursue each. The energy manager's responses are summarized in Table 24. The top response was return on investment, followed by the potential level of energy savings achieved. The importance of the return on investment and potential energy savings in the project decision-making process is a direct response to the energy managers' top challenge in implementing projects: budget.

Table 24: Energy Managers' Project Implementation Criteria (n=13, multiple responses)

Project Implementation Criteria	Count of Responses	Proportion
Return on investment	9	43%
Potential energy savings	3	14%
Deferred maintenance	2	10%
Management approval	2	10%
Project timing	1	5%
Available resources	1	5%
Health and safety concerns	1	5%
Impact on emissions	1	5%
Impact on tenants	1	5%

Finding #18: In general, participants and energy managers are confident in their ability to meet program savings goals. However, project funding remains a major challenge to the successful implementation of energy savings projects from the perspectives of both participants and energy managers.

Recommendation #18: Develop case studies and return on investment calculators that participants and energy managers can leverage to make the business case for investing in energy efficiency. Highlight low-cost non-incented projects and explain the types of projects that present an opportunity to achieve a quick return on investment with little up front capital costs. Also highlight non-energy benefits and operational savings of energy efficiency projects.

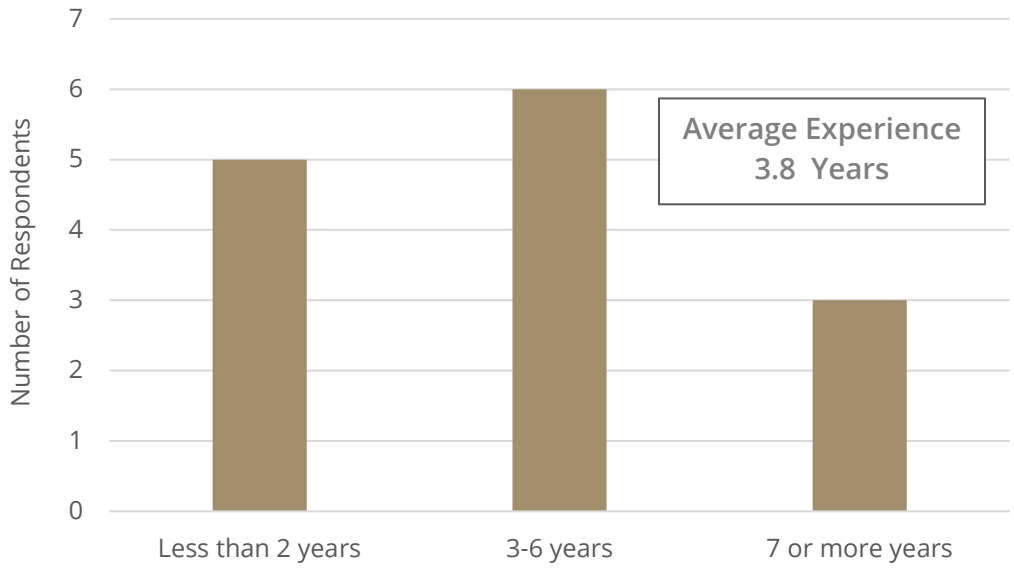
4.4 ENERGY MANAGER PROFILE

EcoMetric interviewed 15 active energy managers to better understand their experience and perspective on the EM program, as well as how they work within participating organizations to achieve conservation goals. This section summarizes our findings.

4.4.1 DESCRIPTION OF ENERGY MANAGERS

Figure 7 summarizes the years of experience the respondents have as energy managers. On average, energy managers have 3.8 years of experience. For many of the energy managers, this experience was gained at the same current participating organization. Three of the 15 energy managers have more than seven years of experience as an energy manager.

Figure 7: Years of Experience as an Energy Manager (n=15)



On average, energy managers interviewed have 2.8 years of experience participating in the IESO EM program. Two of the 15 energy managers claim to have over seven years of experience as an IESO-funded energy manager with the same company, spanning multiple frameworks and delivery models.

Twelve of the fifteen energy managers are Certified Energy Managers (CEM), while five are Certified Measurement and Verification Professionals (CMVP). The IESO offers support to participants for CEM and CMVP training. Participant and energy managers' usage and satisfaction with these training offerings are detailed in Section 4.5.

Finding #19: Energy managers have a depth of experience in energy management and have developed into long-term assets for participating organizations.

Recommendation #19: Encourage participating energy managers to take advantage of IESO support for CMVP certification. With only a third of interviewed energy managers having this certification, increased training in measurement and verification should result in improved savings analyses and supporting documentation for both incented and non-incented projects.

All the interviewed energy managers described a similar set of responsibilities encompassing a wide gamut of energy-related activities. These include energy efficiency project planning, coordination with facility staff, budget tracking, incentive management, data tracking, and reporting. One energy manager, who represented a typical response, described their responsibilities this way:

> *"In addition to writing the energy management plan, [I am] responsible for quarterly reporting and completing multiple energy projects. Also, to identify new energy-saving projects and make business cases for new projects. [I am] responsible for filing IESO applications and providing information to contractors and consultants regarding IESO requirements."*

4.4.2 MEASUREMENT AND VERIFICATION PRACTICES

The energy managers interviewed by EcoMetric all followed a similar measurement and verification process for energy savings projects at their participating organization. The process generally followed these steps:

1. Identify parameters that need to be measured or calculated.
2. Deploy meters (if needed).
3. Establish a baseline.
4. Calculate potential savings.
5. Establish a project timeline.
6. Develop a measurement and verification plan.
7. Submit an application to the IESO for qualified measures.
8. Collect post-project data following measurement and verification plan.

Developing a measurement and verification plan is a critical step to ensure the correct data is collected and for the correct timeframe. Most energy managers work closely with technical reviewers and the IESO to ensure their measurement and verification plans result in sufficient data collection required for the verification of savings through each particular IESO program that incents the program. For non-incented projects, there is a hierarchy of reporting guidelines that depend on the level of estimated annual energy savings, as summarized in Table 25.

Table 25: EM Non-Incented Measure Reporting Requirements

Estimated Savings	Reporting Requirements[5]
Less than 100 MWh/yeah	Only information requested in the Non-Incented Project Details Template (Description of Baseline Condition, Description of Post-Project Condition, Estimated Persistence, Description of Steps Taken to Ensure Persistence)
Between 100 and 250 MWh/year and all lighting projects (without controls)	Provide nameplate data and estimated values to conduct engineering calculations
Between 250 and 500 MWh/year	Spot measurements or continuous measurements (pre- and post-project). Provide analysis and raw data file.
Greater than 500 MWh/year	Continuous measurement (pre- and post-project) or energy baseline model. Provide analysis and raw data file.

For most energy managers, the level of measurement and verification effort corresponds to the level of potential savings for the project, with larger projects receiving more robust measurement and verification. However, all energy managers said they develop their measurement and verification plans to correspond to the minimum requirements of the program the project was a part of. One energy manager's response represents the typical response regarding the level of measurement and verification efforts:

> *"If we've done 20-30 LED retrofits, that is simple. I follow the guidelines if it is over 100 MWh/year; if it is over 500 MWh/year, we step it up. My efforts are based on the amount of savings for regression and baseline modeling. I don't waste my time with small projects as I am the only energy manager in the company across the world."*

Ten of the 15 energy managers interviewed claim that there is no difference in the data collection, analysis, measurement, and verification efforts between incented and non-incented projects they have completed in IESO programs.[6] Four energy managers responded that the level of measurement

[5] Interim Framework Energy Manager Program Non-Incented Project Guidelines, Version 1.0. September 1, 2020.
[6] One energy manager was unable to answer this question as they had only implemented incented projects at the time of the interview.

and verification effort is much higher for incented projects than non-incented projects. One energy manager, who represents a typical response of those who put more effort into incented projects, described the difference in measurement and verification this way:

> *"Absolutely, there is a difference. A lot of our non-incented projects have been small enough that minimal or very little metering and verification are required. Incented [projects] are much larger in scale and require a lot more data and supporting documentation to verify."*

As described in Section 3.1, the impact evaluation revealed that much of the supporting documentation was lacking to confidently verify the savings achieved by non-incented projects. Many non-incented projects fall into the less than 100 MWh/year category, and the details provided by energy managers in the Project Details Template were less than robust. As part of Recommendation #5, EcoMetric suggests providing clearer guidelines to the energy managers on the type of information required to accurately verify the savings for common measure types.

To help overcome the measurement and verification gap between incented and non-incented projects, EcoMetric asked energy managers what the IESO and technical reviewers could do to further support their ability to conduct robust measurement and verification of non-incented projects. Table 26 summarizes their top responses:

Table 26: Energy Manager Suggestions for M&V Support for Non-Incented Projects (n=15)

IESO Support	Technical Reviewer Support
Provide incentives for increased metering	Conduct site visits to better understand how facilities operate, what type of M&V is feasible
Develop a standardized calculation tool for non-incented projects	Provide increased support creating a baseline that considers the many variables in an industrial setting
Include case studies and M&V plans for typical projects in training materials	Provide clearer guidelines and expectations on what is needed to verify savings

The most common answer on further support from the IESO to enhance measurement and verification efforts was to provide incentives for increased metering. Several energy managers expressed that their measurement and verification would greatly improve with access to more meters for sub-metering larger projects, but their organization's budget would not allow for such an investment. Several energy managers also suggested that a site visit from technical reviewers would be beneficial so reviewers could more greatly understand how facilities operate and the most effective way to measure and verify energy savings in each unique setting. Other resources such as

standardized non-incented savings tools, measurement and verification case studies, and improved guidelines were also suggested by energy managers to further support more robust measurement and verification. The IESO maintains several engineering worksheets for the Business Retrofit program that help participants calculate savings for several projects common in the energy manager program. These worksheets can also be share with energy managers to support enhanced measurement and verification efforts for non-incented measures.

All energy managers interviewed stated that they create models to calculate energy savings of projects implemented in IESO programs. The most popular tool to create baseline models was RETScreen, with 13 of the 15 energy managers interviewed confirming that they use the software. Most energy managers also use Microsoft Excel for modeling and more basic energy savings calculations.

4.5 USE OF TRAINING AND SUPPORT SERVICES

This section details the EM program participants and energy managers' use of training and support services offered by the IESO and technical reviewers.

4.5.1 PARTICIPANT USE OF TRAINING AND SUPPORT SERVICES

EcoMetric asked participants about their participation in IESO-funded training. The two training offerings most utilized by the participating organizations were the Certified Energy Manager Training and the Certified Measurement and Verification Professional Training.

Participant satisfaction with the various IESO trainings offered was moderately high to high. We asked participants to rate their satisfaction with these training offerings, with one being not satisfied and 10 being extremely satisfied. Table 27 shows the average ratings for each training offered.

Table 27: Participant Average Training Satisfaction Ratings (n=15, multiple responses)

Training	Count of Responses	Average Score
Building Operator Certification (BOC)	2	8.0
Certified Energy Manager (CEM)	7	7.4
Certified Measurement and Verification Professional (CMVP)	5	8.0
Building Commissioning Professional Certification	2	8.0

Participants were also asked how training resources could be improved to help their organization save more money. Three responses indicated that increasing the training frequency would be helpful, while another response suggested that training should be more focused on lesser-known technologies like electrification and deep energy retrofits instead of lighting and HVAC measures.

Finding #20: Participants have a moderately high to a high level of satisfaction with IESO-funded training offerings. The most attended training offerings were for the CEM and CMVP training. Some participants suggested that increasing the frequency of training would be helpful.

Recommendation #20: Increase the frequency of training offered, focusing on the two most popular sessions—CEM and CMVP training. Consider working with program vendors to set up CEM and CMVP courses specifically for program participants. Consider diversifying training offerings to include technologies like electrification and deep energy retrofits.

4.5.2 ENERGY MANAGER USE OF TRAINING AND SUPPORT SERVICES

EcoMetric also asked the energy managers about their use of program technical support services offered by the IESO and technical reviewers. Their responses are summarized in Table 28. Most energy managers used all support services we listed in the interviews at least once. Fourteen of the 15 energy managers interviewed attended a webinar or training at least once since April 2019. The Energy Manager Hub and baseline coaching were also utilized by nearly all the energy managers at least once. However, when asked about the frequency of use, nine of the 15 energy managers responded that they use the Energy Manager Hub least frequently. Several energy managers stated that they would rather speak to IESO and technical review support staff directly for questions specific to their projects than search through the Energy Manager Hub for relevant information. However, only 9 of the 15 energy managers utilized program technical support for non-incented applications.

When asked about which specific webinars the energy managers attended, a variety of responses were received, but the common theme was that the energy managers tried to attend all the webinars that they possibly could. When asked about the frequency of use, 11 of the 15 EMs responded that they use the webinars and trainings most frequently of the training and support services.

Table 28: Program Support Services used by Energy Managers (n=15, multiple responses)

Training	Count of Responses
Webinars or trainings the program offered since April 2019	14
Any of the Energy Manager Hub's online resources	13
Baseline coaching or support to establish baselines for your projects	12
Program technical support for incented projects	11
Program technical support for your non-incented project applications	9

EcoMetric also asked energy managers what types of information would be useful to help them identify non-incented projects where savings persist. Their responses are summarized in Table 29. The most popular answer, representing two-thirds of responses, was to provide case studies that detail how non-incented savings that persist were achieved in the participating organization's specific industry. One energy manager, who represents the typical response for those looking for case studies, commented:

> *"What would be most helpful are case studies and ideas from other people that have worked. Show us the ideas and results of what has worked in similar situations, how they proved savings with M&V and persistence."*

Table 29: Energy Manager Support to Identify Persisting Non-Incented Savings (n=15)

Information and Support	Count of Responses	Proportion
Case studies	10	67%
Other	2	13%
Webinars and Training	1	7%
Energy data analysis support	1	7%
Don't need any information or support	1	7%

Finding #21: Most energy managers believe that case studies detailing how persisting non-incented savings have been achieved in other, similar situations would be the best kind of support the IESO could offer.

Recommendation #21: Develop case studies to show how persisting non-incented savings have been achieved in different industries and situations. Focus these studies on not only the project specifics but

also how long-lasting savings were verified through measurement and verification. Direct energy managers to the IESO MAL to better understand effective useful lives of common measures.

Finally, EcoMetric asked the energy managers if they believe their organization was receiving adequate information and marketing material about all the IESO programs they can participate in. Twelve of the 15 energy managers answered yes, while one answered sometimes and two answered no. Both energy managers who do not believe their organization is receiving adequate information claimed that communication and information about program opportunities have declined since the transition to the Interim Framework.

4.6 ENBRIDGE AND NRCAN COLLABORATIONS

In the Interim Framework, the IESO entered into collaborative agreements with NRCan and Enbridge to jointly offer the EM program. NRCan has provided funding to support up to five energy managers and Energy Assessments. These energy managers must commit to reducing total annual facility consumption by 3% through both electricity and natural gas measures. Meanwhile, Enbridge is offering incentives of $0.05/m^3 up to $10,000 for gas savings to up to 15 existing EM program participants.

Surveyed participants were asked if they or their energy manager were promoting more fuel switching and natural gas measures at their facility due to the additional funding now in effect from Enbridge. More than half of respondents (56%) said they are not promoting more fuel switching and natural gas measure types, while 31% stated they are, and 13% noted they did not know. This suggests that there is more opportunity to promote the enhanced offerings resulting from the Enbridge and NRCan collaborations if they are to continue. Perhaps providing more technical assistance to identify efficient electrification and natural gas measure opportunities at facilities would be helpful for those energy managers and participating facilities that are not currently exploring those measure types.

EcoMetric interviewed eight energy managers that are active in the Enbridge or NRCan collaborations. We asked these energy managers how, if at all, they prioritize projects to achieve the annual electric and gas savings targets the program requires. Only one of the eight energy managers said they specifically target one form of savings over the other. This energy manager prioritizes electric energy and demand savings as they believe the payback period is shorter. The other seven energy managers claim they do not prioritize between electric and natural gas savings but prioritize the implementation of projects that achieve the most energy savings and receive the highest incentive regardless of the fuel source. It was clear from the interviews that the overall business case for the specific project was of higher priority than meeting a certain goal for a certain fuel.

Finding #22: Energy managers active in the Enbridge and NRCan collaborations do not prioritize projects based on electric versus gas savings targets. Energy-saving projects are prioritized on the business case.

EcoMetric also asked the energy managers if they account for the interactive effects of energy efficiency projects when considering electric and gas targets and incentives provided by the program. All eight energy managers confirmed that they account for interactive effects and analyze the projects at the holistic energy savings level. Two of the energy managers stated that using RETScreen to calculate potential savings at the building level made it very simple to account for any interactive effects.

Efficient electrification measures can be a great opportunity to achieve energy savings, but their impacts can be complicated in a program that incentivizes both electric and gas savings like these collaborations. EcoMetric asked the energy managers if they have completed or plan on completing an electrification or fuel switching project as part of the program. Four of the eight energy managers answered yes. Projects implemented by the energy managers include:

- Replacement of electric with gas fired rooftop units
- Air-source and ground-source heat pumps
- Electric to CO_2 based refrigeration system

EcoMetric also asked the energy managers if they had completed or planned on completing any heating electrification projects to meet gas savings targets. Only one energy manager answered that they were planning on implementing heating electrification through their long-term greenhouse gas reduction roadmap via heat pump projects. One energy manager who did not plan on implementing heating electrification stated:

> *"We see a huge potential liability in electrifying our heating across the board, as the potential for winter peaks could return any year now. There is a lot of uncertainty around how the economics of heating electrification will look, so we're looking for opportunities to reduce gas consumption while trying to limit the demand and amount of global adjustment exposure."*

Finding #23: So far, in the early stages of the Enbridge and NRCan collaborations, half of the energy managers have implemented or plan on implementing efficient electrification projects.

Heating electrification is not currently seen as a viable project for most energy managers.

4.7 PARTICIPANT CONTRACT COMPLIANCE – SECTION 3(D)

Section 3(d) of the participant contract stipulates that an energy manager must be a new employee or, if an existing employee fulfills the position, the prior position of that employee must be fulfilled by another staff person.

Surveyed participants noted that 65% of energy manager roles were fulfilled with external hires, while 35% were fulfilled using an internal staff person that was promoted to the energy manager position. For those that utilized an internal hire to fulfill the energy manager role, those participants were asked if that person's previous job or role had been filled by another employee in their organization. Fifty percent of respondents noted that the internal hire's previous job had not been filled, 33% noted that it had, while 17% stated that they were not sure.

Finding #24: Some participants are not fully compliant with Section 3(D) of the Participant Contract.

Recommendation #22: Include clear guidelines for Section 3(D) compliance in all EM program-related training and education resources. Require that participants provide information on the status of internal hires' previous role.

4.8 FUTURE PROGRAM OPPORTUNITIES

EcoMetric asked surveyed participants how the IESO can help in several different aspects of their organization's energy management efforts in the future. The predominant theme in the responses was overwhelming that more incentives would aid participating organizations in a variety of ways.

When asked how the IESO can support their organization's efforts to transition from natural gas to electric in pursuit of greenhouse gas reduction, 30% of participants surveyed indicated more incentives would be of the greatest assistance, while several respondents (25%) noted that more technical support in identifying electrification and retrofit opportunities would be helpful. Table 30 shows the breakdown of responses received. While enhancing incentives may not be feasible from a budgetary perspective, the IESO may want to consider how additional technical support can be provided in relation to electrification projects going forward.

Table 30: IESO Support for GHG Reduction (n=16)

IESO Support for Transition to Electric	Count of Responses	Proportion
More incentives	6	30%
More technical support for electrification & retrofit projects	5	25%
Don't know	4	20%
Electricity rate reductions	2	10%
Financial modeling	1	5%
Lower risk on battery projects	1	5%
Share success stories of effective energy efficiency electric systems	1	5%

When asked about their desired support from the IESO for the recovery from the COVID-19 pandemic, 31% of the participants stated that they did not need any support from the IESO moving forward, while 25% noted that more incentive support would be helpful to upgrade equipment as they recover. One participant noted that having assistance with an impact analysis of their operation to better understand how store closures and operational changes impacted their energy consumption would be helpful.

EcoMetric asked survey participants if their organization has a water savings goal, to which only 31% stated that they did. Of those with a water savings goal, 60% indicated that their energy manager is actively pursuing that goal.

More than half of survey participants (67%) noted that more incentives would be the greatest support to allow them to better capture all fuel savings, including natural gas and water. One participant that having educational programming related to this would be valuable. Additionally, another participant sees an opportunity for more integration between IESO and Enbridge in addressing these savings opportunities with customers.

Finding #25: Participants expressed that more incentives would be the best way to support all fuel savings, including natural gas, and water.

In the absence of an incentive, 81% of respondents indicated that they would keep their energy manager employed. Over 60% of respondents also noted that the job requirements of the energy manager would change if there was less or no incentive. These responses suggest that the energy managers are a highly valued asset to these organizations, but the role and responsibilities of the energy manager would likely be modified if the funding were to be decreased or removed entirely. The respondents identified various ways the energy manager position would change if there was less or no incentive offered, including a broader focus on sustainability and greenhouse gas reduction

tracking, or potentially focusing on non-energy-related efforts such as maintenance and general facilities engineering.

Participants were also asked what other support they would need to help energy management activities continue if there was no incentive for an energy manager position. Their responses are summarized in Table 31. Four respondents indicated that technical assistance would be helpful in the absence of the energy manager incentive. More specifically, these respondents noted that having more support with developing incentive applications and creating baselines would be helpful. Two participants noted that receiving regular program updates and information related to incentives and new offerings would be helpful. Given that current energy managers serve as a conduit for information to the participating organization, IESO may need to consider new pathways for information to flow to key contacts within these organizations if that position is no longer funded.

Table 31: Participant Support Needed Absent Energy Manager Incentive (n=15)

IESO Support Needed Absent EM Incentive	Count of Responses	Proportion
Technical assistance	4	36%
Regular program updates	2	18%
Training	1	9%
Goal development	1	9%
Don't know	1	9%
LDC account representative support	1	9%
External consultant support	1	9%

Finding #26: Eighty-one percent of participants surveyed indicated that they would keep their energy manager employed in the absence of an incentive. In order to keep the role, many participants said the energy manager would need to expand their responsibilities and maintain a broader focus than just energy efficiency. Without an incentive for a full-time energy manager, participants would benefit most from technical assistance from the IESO to complete applications, create baselines, and calculate potential energy savings.

Recommendation #23: Encourage participants to make a broader commitment to energy efficiency by adopting a Strategic Energy Management (SEM) approach. Consider developing tools and providing training and education to organizations so they can take ownership of and manage energy efficiency throughout their organization.

EcoMetric also asked participants what barriers or gaps exist that could be addressed through an Energy Management program from the IESO to ensure the beneficial work of the funded energy

manager could continue to absent the funding. Two survey respondents noted that more frequent touch points with the IESO to discuss energy efficiency efforts and identify areas of support are needed.

EcoMetric also asked the energy managers what the IESO could do to help senior management build internal capacity for increasing efficiency of operations on an ongoing basis. Their responses are summarized in Table 32. Over half of the energy managers responded that training and webinars aimed at senior management would help build internal capacity to increase the efficiency of operations at their participating organizations. Three energy managers also suggested that direct engagement with senior management by IESO representatives to discuss opportunities to increase operational efficiency at their specific sites would be beneficial to build internal capacity.

Table 32: Energy Manager Support Needed to Build Internal Efficiency Capacity (n=15)

IESO Support Needed to Build Internal Efficiency Capacity	Count of Responses	Proportion
Training and webinars	8	53%
Senior management engagement and site visits	3	20%
Don't know	2	13%
Case studies	1	7%
More incentives	1	7%

One energy manager, who represents a typical response of those who suggested senior management training, answered:

> *"We need more training aimed at senior management. We should show [senior management] how energy managers can lead to cost savings, among many other benefits."*

Finding #27: Energy managers believe that increased training and engagement from the IESO with senior management at their participating organizations would allow them to build internal capacity to improve operational efficiency.

Recommendation #24: Consider creating training and educational resources aimed at senior management to encourage the development of internal capacity to increase the efficiency of operations. Resources for senior management should be more strategic than technical, focusing on energy efficiency as an operational resource.

5 JOB IMPACTS RESULTS

5.1 JOB IMPACTS SUMMARY RESULTS

As summarized in Table 33, the EM program created an estimated 68 jobs in PY2019 and PY2020. Of these 68 jobs, 37 were direct jobs, 10 were indirect jobs, and 21 were induced jobs. Nearly all the jobs created from the program were local, with 62 of the 68 total jobs created in Ontario. In terms of full-time equivalent (FTE), the program created an estimated 61 total jobs.

Direct jobs include all jobs created by EM program activity, including the energy managers themselves, administrative jobs, contractors hired to complete projects, engineers, and inspectors, among many others. Indirect jobs include the additional jobs created from economic activity related to program participation, including equipment and supply distribution centers, delivery drivers, and manufacturing, among many others. Induced jobs include the jobs supported by the "ripple effects" of economic activity from EM program participation (i.e., the re-spending of income and benefits resulting from EM program activity).

Detailed job impact results and model inputs are included in Sections 5.2 and 5.3, respectively.

Table 33: EM Non-Incented Job Impacts

Job Impact Type	Ontario FTE	Canada Total FTE	Ontario Jobs	Canada Total Jobs
PY2019				
Direct	9	9	9	9
Indirect	4	4	5	5
Induced	2	4	4	6
PY2019 Total	**15**	**17**	**18**	**20**
PY2020				
Direct	28	28	28	28
Indirect	4	5	3	5
Induced	10	11	13	15
PY2020 Total	**42**	**44**	**44**	**48**
Grand Total	**57**	**61**	**62**	**68**

Finding #28: The EM non-incented program in the IF has resulted in the creation of 68 jobs throughout Canada, most of which are direct jobs in Ontario's other provincial and territorial government services industries.

5.2 JOB IMPACTS DETAILED RESULTS

This section breaks down the job impacts of the EM non-incented program in PY2019 and PY2020 in greater detail.

5.2.1 EM NON-INCENTED JOB IMPACTS BY INDUSTRY

Table 34 summarizes the job impacts by industry for the EM non-incented program in PY2019 and PY2020. Nearly half of the jobs created by the program are in the other provincial and territorial government services sector, which is where the I/O model places the IESO-funded energy managers and their energy management teams. The wholesale and retail trade and manufacturing sectors also account for 17 total jobs created throughout Canada. The program funding shock, represented by the portion of EM program funding covered by Ontario's residential sector, resulted in job losses in the retail trade and accommodation and food services sectors. These sectors are some of the largest industries in the province in terms of a number of workers, so the program funding shock impacted them the most.

Table 34: EM Non-Incented Job Impacts by Industry

Industry	Ontario FTE	Canada Total FTE	Ontario Jobs	Canada Total Jobs
Other provincial and territorial government services	32	32	33	33
Wholesale Trade	4	5	4	6
Retail Trade	5	6	5	6
Manufacturing	4	4	4	5
Finance, insurance, real estate, rental, and leasing and holding companies	2	3	3	3
Engineering Construction	1	2	2	3
Non-residential building construction	2	2	3	3
Professional, scientific, and technical services	2	2	2	3
Accommodation and food services	1	1	2	2
Administrative and support, waste management and remediation services	1	1	1	1
Other services (except public administration)	1	1	1	1
Health care and social assistance	1	1	1	1
Transportation and Warehousing	1	1	1	1
Total	**57**	**61**	**62**	**68**

5.2.2 EM NON-INCENTED JOB IMPACTS BY MODEL SHOCK

As described in Section 2.2.7, job impacts of the EM non-incented program were estimated leveraging three shocks in the StatCan I/O model: demand for goods and services related to the program, business reinvestment, and program funding. The shock that resulted in the largest number of jobs created was the demand for goods and services related to the EM non-incented program. As summarized in Table 35, the demand shock resulted in 53 jobs created in Ontario and 57 total jobs throughout Canada. Nearly all of these jobs are direct job impacts in Ontario, primarily representing the energy managers themselves. The complex value chain of equipment and the high number of projects also resulted in 24 indirect and induced jobs created throughout Canada.

Table 35: EM Non-Incented Job Impacts from Demand for Goods and Services Shock

Job Impact Type	Ontario FTE	Canada Total FTE	Ontario Jobs	Canada Total Jobs
Direct	32	32	33	33
Indirect	6	7	6	7
Induced	10	12	14	17
Total	**48**	**51**	**53**	**57**

The job impacts of the business reinvestment shock are summarized in Table 36. This shock represents the amount of bill savings the participating organizations reinvest in their company to spur further economic activity. The business reinvestment shock resulted in 14 total jobs created in Canada, 12 of which are in Ontario.

In the process and NTG interviews with EM program participants, EcoMetric asked participants directly what percentage of bill savings they planned to reinvest. EcoMetric then applied this percentage to each participants' bill savings calculated based on net energy savings multiplied by IESO's retail electricity rate. Overall, the rate of reinvestment averaged 86%.

Table 36: EM Non-Incented Job Impacts from Business Reinvestment Shock

Job Impact Type	Ontario FTE	Canada Total FTE	Ontario Jobs	Canada Total Jobs
Direct	6	6	6	6
Indirect	2	3	3	4
Induced	2	3	3	4
Total	10	12	12	14

The final shock, program funding, represents the increase in Ontario residents' hydro bills from funding the EM program. The IESO estimates that 35% of the portfolio's funding is supplied by the

residential sector. EcoMetric applied this 35% to the total $1.3M EM non-incented program budget across PY2019 and 2020, resulting in a shock of ~$490,000. As this shock represents less money available to the residential sector for spending throughout the economy, the job impacts are negative.

The job impacts of the program funding shock are summarized in Table 37. Overall, the program funding shock resulted in -3 total jobs across Canada. These jobs were from the accommodation and food services and retail trade industries, two of the largest industries in Ontario in terms of a number of jobs. Compared to the jobs created by the program through the demand shock, the jobs eliminated through program funding are relatively minor.

Table 37: EM Non-incented Job Impacts from Program Funding Shock

Job Impact Type	Ontario FTE	Canada Total FTE	Ontario Jobs	Canada Total Jobs
Direct	-1	-1	-2	-2
Indirect	-	-1	-1	-1
Induced	-	-	-	-
Total	**-1**	**-2**	**-3**	**-3**

5.3 MODEL INPUTS

Table 38 summarizes the model inputs for the largest of the economic shocks in the EM non-incented job impacts analysis, the demand for goods and services from the participating organizations. The total spending on goods and services in the EM program in PY2019 and PY2020 is $6.1M. Of this amount, $4.9M was spent on labour, and $1.1M was spent on the equipment.

Table 38: EM Non-Incented Demand for Goods and Services Inputs

Economic Category	Labour (CAD)	Equipment (CAD)	Total (CAD)
Energy Manager Salaries	$2,267,560	-	$2,267,560
Heating and cooling equipment (except household refrigerators and freezers)	$1,277,505	$426,002	$1,703,507
Metal Valves and pipe fittings	$607,500	$202,500	$810,000
Measuring, control, and scientific instruments	$335,802	$352,849	$688,651
Lighting fixtures	$256,559	$101,170	$357,729
Logging, mining, and construction machinery and equipment	$75,000	$25,000	$100,000
Pumps and compressors (except fluid power)	$63,127	$20,769	$83,896
Power, distribution, and other transformers	$20,250	$6,750	$27,000
Electric light bulbs and tubes	$16,006	$3,513	$19,519
Industrial and commercial fans, blowers, and air purification equipment	$11,865	$5,085	$16,950
Total	**$4,931,174**	**$1,143,638**	**$6,074,811**

The largest contributor to the demand for goods and services in the EM non-incented program is the energy managers' salaries. This value includes the salaries of all energy managers invoiced in PY2019 and PY2020 and aligns with the methodology EcoMetric employed for the cost effectiveness analysis. The rest of the spending in the program was for equipment and labour for HVAC, building control, lighting, mining, pumps, and VFD projects.

Table 39 summarizes the business reinvestment shock EcoMetric leveraged for the EM non-incented job impacts analysis. As discussed in Section 5.2, the average rate of reinvestment for the participating organizations was 86%. In total, participating organizations in the PY2019 and PY2020 sample frame reinvested $2,017,171 of their first-year bill savings from EM non-incented projects. EcoMetric used first-year bill savings to calculate the reinvestment shock as the I/O model does not take into account long-term economic and technological changes. Further, when EcoMetric asked participants about their rate of reinvestment, many expressed there was a high level of uncertainty regarding business strategies past the very near term. As such, leveraging the net present value of lifetime savings would result in an inaccurate estimation of job impacts from business reinvestment.

Based on the participating organization, the model estimates the amount of reinvestment in each economic category and applies the production function to estimate the economic impact. Nearly 75% of reinvestment came from the other municipal government services, utilities, and real estate sectors. The balance of reinvestment was from the retail trade, mining, education, and manufacturing industries.

Table 39: EM Non-Incented Business Reinvestment Shock Inputs

Economic Category	Business Reinvestment (CAD)	Percent of Total Reinvestment
Other municipal government services	$508,170	25%
Utilities	$506,384	25%
Real estate and rental and leasing	$429,088	21%
Retail Trade	$186,716	9%
Transportation equipment manufacturing	$167,200	8%
Mining and quarrying (except oil and gas)	$119,358	6%
Chemical manufacturing	$84,167	4%
Paper manufacturing	$8,545	0%
Educational services	$7,542	0%
Total	**$2,017,171**	**100%**

The following table presents the conclusions and recommendations from the PY2020 evaluation findings for the EM non-incented program.

Table 40: EM Non-Incented Evaluation Findings and Recommendations

Findings and Conclusions		Recommendations		Actionable Audience
EM Impact Evaluation Results (Section 3)				
1	The technical review process was disorganized, and the robustness of the reviews was inconsistent. The first step of the impact evaluation process was to gather supporting documentation and calculation files for non-incented measures that received a technical review. Acquiring the files from the technical reviewer proved to be slow and incomplete. In several cases, the evaluation team had to ask energy managers to resubmit files that the technical reviewer could not locate. Supporting documentation for many of the smaller projects was inadequate to determine how savings were calculated and reviewed. Many of the technical review analyses were well documented and followed industry-standard methods. Around 15% of analyses were rudimentary and failed to correct basic mistakes in energy manager savings calculations. For one project, the peak demand savings estimate was the power draw of the equipment post-retrofit instead of the reduction in peak demand associated with the measure.	1	Encourage better documentation from the energy managers. In the EM Quarterly Report Excel workbooks, details on how the baseline and post-project conditions were quantified and how annualized electricity savings were estimated were commonly minimal (e.g., simple statements such as "Used RETScreen" were provided). Other workbooks referenced specific names of files that presumably contained the savings calculations used to determine reported savings values but were not included with project documentation. At the very least, project documentation should include the spreadsheet analyses that were used to calculate energy and peak demand savings for each project.	IESO, Technical Reviewer

Findings and Conclusions		Recommendations		Actionable Audience
1	See Finding #1.	2	Increase the level of detail for non-incented project documentation for projects estimated to achieve less than 100 MWh/year. Provide energy managers with clearer guidelines on the type of information required to accurately verify the savings for common measure types. Projects estimated to achieve less than 100 MWh/year accounted for 155 out of 177 projects evaluated in PY2020—representing 33% of reported electric energy savings for the program.	IESO
2	Most projects assumed that energy consumption was unaffected by the COVID-19 pandemic. Several energy managers implemented optimization measures in March 2020 to modify the lighting and HVAC schedules of buildings. These measures were analyzed using IPMVP Option C regression models in RETScreen using pre-pandemic consumption data as the baseline. Energy and peak demand savings were calculated using consumption data from March 2020 onward when varying levels of COVID-19 restrictions were in place. The energy manager and technical reviewer clearly documented the implicit assumption that building operation (occupancy, hours of operation) did not change due to the COVID-19 pandemic, which is not always accurate as the effects of the pandemic are far-reaching and complex and the effect on organizations varied widely by industry.	3	Expect consistency from energy managers and technical reviewers with respect to adjustments for Non-Routine Events such as the COVID-19 pandemic. Adjustments for NREs can be achieved by normalizing the data across pandemic-impacted periods or extending baseline and performance periods to include “normal” operations.	IESO

Findings and Conclusions		Recommendations		Actionable Audience
3	The PY2020 non-incented projects generally showed improved attention to detail in the peak demand savings calculations. In prior years, EcoMetric often found peak demand savings values set to missing or zero in the program tracking data. In other cases, the peak demand savings would be the change in connected load without consideration of coincidence. One project involved a retrocommissioning measure for which no summer peak demand savings were calculated. EcoMetric estimated the peak demand savings based on the verified energy savings and the IESO load shape for the most appropriate facility type.	4	Energy managers should strive to estimate peak demand savings for all projects, regardless of the measure type, availability, or timing of performance data.	Energy Managers
4	Energy savings estimates were not always annualized. The claimed savings for several of the measures in our evaluation sample were based on observed savings over a subset of the year. In most cases, this was driven by data availability and the timing of an Energy Manager's annual review.	5	Energy managers and technical reviewers should attempt to estimate the energy savings over a full year, regardless of the time-of-year or duration of measurement data.	Technical Reviewers, Energy Managers
5	Documentation for a lighting scheduling measure within one project did not include information about the fixtures involved (i.e., wattages or quantities). This essentially prevented EcoMetric from performing a full energy savings analysis for the measure.	6	Project documentation should always include, at a minimum, information related to essential inputs to savings calculations. Ideally, project documentation should also include a clear and logical explanation for how the ex-ante savings were calculated and a rationale for any assumptions involved.	Technical Reviewers, Energy Managers

Findings and Conclusions		Recommendations		Actionable Audience
6	Many projects were umbrella projects that covered three or four smaller projects, each relating to a different technology at the same location. One project, for example, involved an LED lighting upgrade, HVAC upgrades, and occupancy ventilation control. These types of projects create difficulties in verifying savings and determining proper in-service dates and expected useful lives when several smaller projects are combined into one.	7	If feasible, projects with multiple measures should be three different projects, each with its own description, savings calculations, in-service date, and expected useful life. If premise-level meter data is used to estimate savings in such cases, energy managers should estimate the premise-level savings first, then distribute the total savings between the projects based on assumptions about the relative impact of each project.	Technical Reviewers, Energy Managers
7	Overall, 61% of EM non-incented energy savings persist through 2022, and the other 39% will expire before the end of 2022.			
8	The full cost of energy manager salaries and administrative spending related to outreach and training of energy managers is included in the cost effectiveness analysis of the EM non-incented program. While the full costs of delivering the EM program are included in the cost effectiveness analysis, only the benefits from non-incented measure savings are included. EM contracts require that only 10% of the savings goal must be through non-incented improvements.	8	Salaries paid to energy managers and administrative spending related to the outreach and training of energy managers should be distributed amongst the programs the energy managers are achieving savings.	IESO EM&V Team, Evaluation Contractors

Findings and Conclusions		Recommendations		Actionable Audience
	EM Process Evaluation Results (Section 4)			
9	The impact of IESO-funded energy managers on the IESO savings goals goes far beyond the non-incented measures detailed in this report. IESO-funded energy managers were responsible for 23,970 MWh reported energy savings in PY2020, accounting for 11% of total reported energy savings across the Business Retrofit, PSUP, and EM non-incented programs. Organizations with IESO-funded energy managers also have 34 PSUP projects under contract that are not yet in service, so their share of IESO portfolio savings is expected to greatly increase in the next evaluation reports.	9	Develop a Reporting Template to track the verified savings achieved from projects implemented by IESO-funded energy managers across the IESO programs.	IESO EM&V Team, Evaluation Contractors
10	Energy managers implemented much larger projects, on average, than the general population in the Business Retrofit program. Retrofit projects led by IESO energy managers averaged 103,911 kWh of annual savings, compared to 60,609 kWh for the rest of the program.	9	See Recommendation #9	
11	Program participants see energy managers as a valuable resource to focus on energy management and drive the implementation of projects.	10	Consider highlighting the perceived value of energy managers to industrial participants to encourage them to take ownership of holistic energy management in their organizations.	IESO
12	The achievement of greenhouse gas emissions reductions and return on investment are important factors in the prioritization of energy saving projects for energy managers. No energy manager mentioned electricity-savings as a priority.	11	Consider providing information and case studies to energy managers on how electric energy efficiency projects can promote beneficial electrification strategies.	IESO

Findings and Conclusions		Recommendations		Actionable Audience
13	Energy managers achieve savings across several fuel types, but only kWh and kW savings are reported by the IESO. Energy managers suggest that more information such as case studies and calculators would support the identification and reporting of all types of savings they achieve.	12	Develop case studies, training, calculators, and other reference materials to support energy managers in achieving, calculating, and reporting all savings in their organizations, including water, fossil fuels, and emissions. Publish a measure substantiation sheet that includes fuel and water savings to be included with the IESO's Measures and Assumptions List (MAL).	IESO
13	See Finding #13.	13	Consider updating the Energy Manager Quarterly Submission document to include sheets for reporting water, fossil fuel, and emissions reductions achieved.	IESO
14	Surveyed participants indicated that the IESO Business Development Manager and the LDC Key Account Manager were the most prominent communication channels used to share Energy Manager program information with participants.			
15	Overall program satisfaction was high among Energy Manager program participants. However, participants were least satisfied with reporting requirements and the technical review process. A common theme was related to the turnaround time it takes to receive feedback on the reports being very lengthy. Energy managers were also least satisfied with the reporting and technical review processes, as summarized in Finding #17.	14	Ensure IESO and technical review staff set clear expectations with participants regarding the review process and timeline to avoid participant frustration.	IESO, Technical Reviewers
15	See Finding #15.	15	Coordinate with technical review staff to ensure there are set goals for technical review timelines.	IESO, Technical Reviewers

Findings and Conclusions		Recommendations		Actionable Audience
16	Several participants expressed frustrations with the length of time it takes to receive program payments.	16	Consider noting estimated payout timelines in application materials and provide that to participants to manage their expectations in the future.	IESO
17	Energy managers expressed moderate levels of satisfaction with the overall program. Energy managers are satisfied with training offered by the IESO and technical reviewers, but satisfaction declines once the energy managers actually have to calculate and report savings they achieve. Pain points include the support for non-incented project savings calculations, reporting requirements, and technical support.	17	Work to develop technical review and program support staff that are experts in common industries that participate in the EM program, such as manufacturing, mining, and universities. These industries have vastly different patterns in energy usage, facilities, and business needs which result in vastly different energy-saving projects and calculations. By developing experts to work with energy managers in specific industries, the savings calculation, reporting, and technical review process should be less burdensome as experts leverage lessons learned and commonalities from similar situations.	IESO, Technical Reviewers
18	In general, participants and energy managers are confident in their ability to meet program savings goals. However, project funding remains a major challenge to the successful implementation of energy savings projects from the perspectives of both participants and energy managers.	18	Develop case studies and return on investment calculators that participants and energy managers can leverage to make the business case for investing in energy efficiency. Highlight low-cost non-incented projects and explain the types of projects that present an opportunity to achieve a quick return on investment with little up front capital costs. Also highlight non-energy benefits and operational savings of energy efficiency projects.	IESO
19	Energy managers have a depth of experience in energy management and developed into long-term assets for participating organizations.	19	Encourage participating energy managers to take advantage of IESO support for CMVP certification. With only a third of interviewed energy managers having this certification, increased training in measurement and verification should result in improved savings analyses and supporting documentation for both incented and non-incented projects.	IESO

Findings and Conclusions		Recommendations		Actionable Audience
20	Participants have a moderately high to a high level of satisfaction with IESO-funded training offerings. The most attended trainings were the CEM and CMVP training. Some participants suggested that increasing the frequency of training would be helpful.	20	Increase the frequency of training offered, focusing on the two most popular sessions—CEM and CMVP training. Consider working with program vendors to set up CEM and CMVP courses specifically for program participants. Consider diversifying training offerings to include technologies like electrification and deep energy retrofits.	IESO
21	Most energy managers believe that case studies detailing how persisting non-incented savings have been achieved in other, similar situations would be the best kind of support the IESO could offer.	21	Develop case studies to show how persisting non-incented savings have been achieved in different industries and situations. Focus these studies on the project specifics and how long-lasting savings were verified through measurement and verification. Direct energy managers to the IESO MAL to better understand effective useful lives of common measures.	IESO
22	Energy managers active in the Enbridge and NRCan collaborations do not prioritize projects based on electric versus gas savings targets. Energy saving projects are prioritized on the business case.			
23	So far, in the early stages of the Enbridge and NRCan collaborations, half of the energy managers have implemented or plan on implementing efficient electrification projects. Heating electrification is not currently seen as a viable project for most energy managers.			
24	Some participants are not fully compliant with Section 3(D) of the Participant Contract.	22	Include clear guidelines for Section 3(D) compliance in all EM program-related training and education resources. Require that participants provide information on the status of internal hires' previous role.	IESO
25	Participants expressed that more incentives would be the best way to support all fuel savings, including natural gas and water.			

Findings and Conclusions		Recommendations		Actionable Audience
26	Eighty-one percent of participants surveyed indicated that they would keep their energy manager employed in the absence of an incentive. In order to keep the role, many participants said the energy manager would need to expand their responsibilities and maintain a broader focus than just energy efficiency. Without an incentive for a full-time energy manager, participants would benefit most from technical assistance from the IESO to complete applications, create baselines, and calculate potential energy savings.	23	Encourage participants to make a broader commitment to energy efficiency by adopting a Strategic Energy Management (SEM) approach. Consider developing tools and providing training and education to organizations so they can take ownership of and manage energy efficiency throughout their organization.	IESO
27	Energy managers believe that increased training and engagement from the IESO with senior management at their participating organizations would allow the organizations to build internal capacity to improve operational efficiency.	24	Consider creating training and educational resources aimed at senior management to encourage the development of internal capacity to increase efficiency of operations. Resources for senior management should be more strategic than technical, focusing on energy efficiency as an operational resource.	IESO
	EM Job Impacts Results (Section 5)			
28	The EM non-incented program in the IF has resulted in the creation of 68 jobs throughout Canada, most of which are direct jobs in Ontario's other provincial and territorial government services industry.			

Appendix A DETAILED METHODOLOGIES

A.1 Gross Savings Analysis

A.1.1 Data Sources

Table 41 contains a list of the data sources used from verifying gross savings.

Table 41: Data & Information Sources Used for Impact Evaluation

Item	Description	Source
Reported (Ex-Ante) participation & savings	Savings by program, project, & measure	Technical Reviewer
Participant contact information	For project-specific interviews and site visit coordination	Technical Reviewer & IESO
Project files	Including M&V data & documentation	Technical Reviewer & IESO
Reporting template(s)	For impact reporting	IESO
Cost-effectiveness parameters	Avoided costs, admin costs, discount rate	IESO

EcoMetric used several distinct data-collection techniques to fulfill evaluation objectives, explained below.

A.1.2 Gross Savings Verification Methods

Project Documentation Review

Project documentation was provided mainly by the IESO's technical reviewer, and in some cases, by the energy manager. Project files utilized for review and analysis included project incentive applications, quarterly and annual energy manager submission files, engineering workbooks, equipment cut sheets, invoices, email exchanges, technical drawings, M&V plans and reports, and digital photos.

Project Audits

Project audits verify the accuracy of savings calculations, assumptions, and M&V conducted by the technical reviewer, contractors, customers, and any other parties involved in the application, implementation, and technical review process. EcoMetric performed audits for each project in the

sample, utilizing technology-specific methods and tools and testing the calculations and assumptions used to estimate reported savings for each project.

Level 1 audits consist of a desk review of project documentation and supporting calculations, including applications, savings worksheets, M&V plans, M&V reports, engineering studies, metered data, invoices, and any other documents made available.

Level 2 audits expand upon the work conducted in the Level 1 audits, and as stated above, in many cases, including a virtual review of the equipment installation and operating parameters.

Data collected from the Level 1 and Level 2 audit activities enabled EcoMetric to verify energy and demand savings for each EM project.

Ratios of gross verified to reported savings are realization rates. EcoMetric analyzed a census of EM non-incented measures in PY2020. A program-level realization rate was calculated by dividing total verified savings by total reported savings for energy and demand. These program-level realization rates were applied to all non-incented measures reported in the PY2020 sample frame.

A.2 Net Savings Analysis

A.2.1 Net Savings Data Collection

For PY2020 projects, EcoMetric implemented the NTG questionnaire originally developed for the Conservation First Framework to provide consistency in the evaluation approach across program frameworks. The traditional free ridership approach first establishes a gross baseline (e.g., industry standard practice) and then conducts a free ridership interview to determine the degree of influence the program had in moving the customers from the gross baseline to the high-efficiency alternative that was installed. This is an excellent approach for straightforward measures, for those where only two efficiency options are available (the binary choice of the high or low-efficiency options), and when the questionnaire must be written to cover diverse technologies. All measures in the IESO program fit this approach.

The primary data collection method for NTG data was through in-depth self-report interviews. This approach was consistent with the CFF approach and is allowed by the IESO's Evaluation, Measurement, and Verification Protocol v4.0. The general NTG process is as follows:

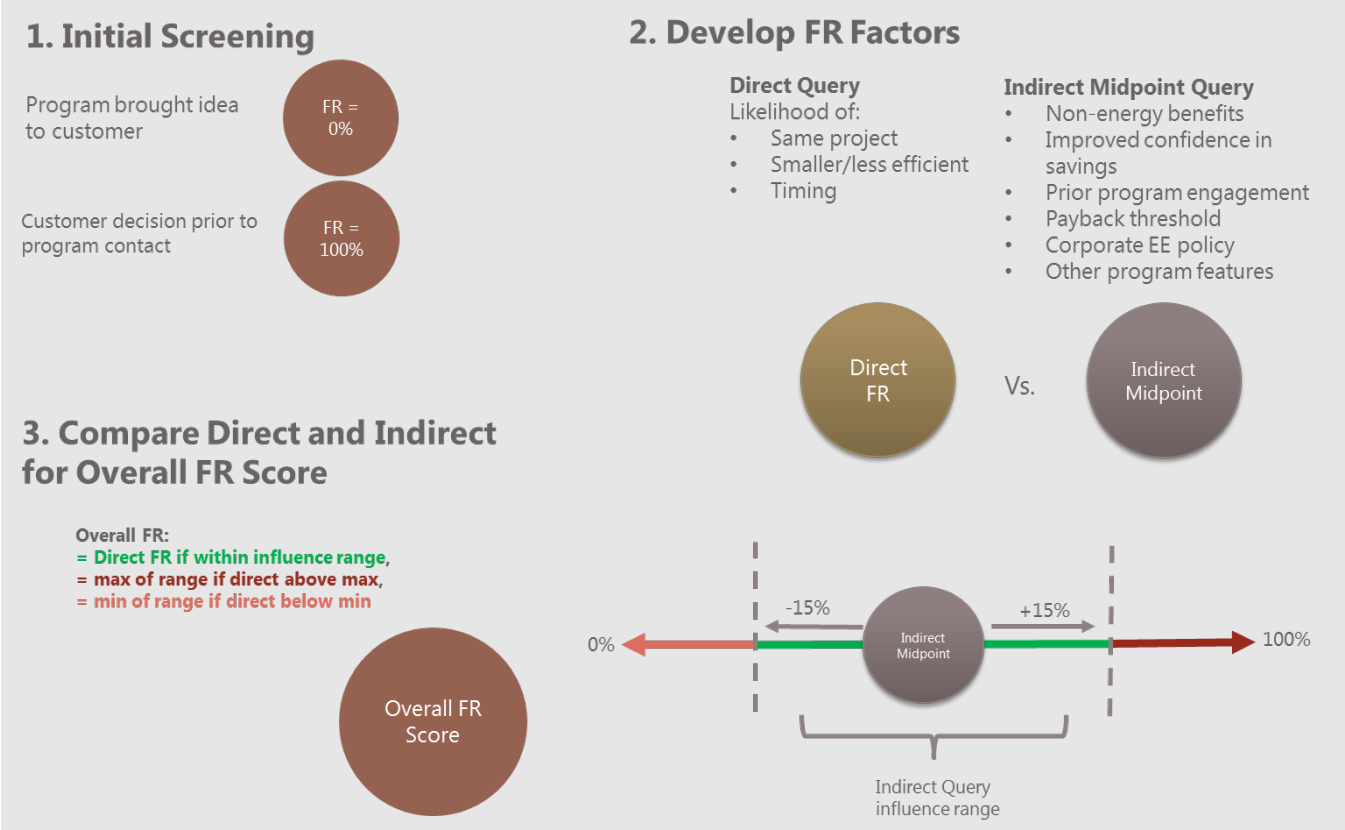
- The NTG surveys addressed the free ridership component of net savings analysis, calculating both a direct free ridership score and an indirect score that incorporates questions about program influence and any other factors that possibly influenced the decision to implement the project. Spillover was not assessed during the PY2020 evaluation.

- Prior to roll-out of the NTG survey instruments, EcoMetric conducted training exercises to ensure that the team has the appropriate training and expertise to conduct the interviews. This included a refresher session on interviewing tone, follow-up questions, time management, and avoiding leading questions, as well as pre-tests of interview scripts and pilot testing with initial recruited participants.
- EcoMetric takes considerable steps to ensure that interviews are conducted with the primary decision-maker(s) involved in the decision-making, or at the very least, aware of the decision-making criteria for the project. The EcoMetric team works with IESO to identify the primary decision-makers for each project by first reviewing the project files and customer contact information.
- Once likely decision-makers are identified, the IESO sent personalized recruitment emails to these contacts notifying them of the upcoming interview. EcoMetric then contacted the customers directly, screening them prior to starting the interview to confirm that they were the decision-maker or involved/aware of the decision-making process. EcoMetric leveraged a combination of email and phone messages to customers at different times of day and week and logs each contact attempt (time, date, target, result) in a contact tracking system. EcoMetric worked with IESO to conduct another contact attempt for any sites that were not responsive to initial recruitment efforts.
- In preparation for the interviews, the EcoMetric staff reviewed the project files for each customer to understand the projects completed, timelines, and any other unique characteristics of each customer. For customers that implemented multiple projects during the study year, EcoMetric investigated the two projects with the largest electricity savings to capture the most savings without creating an excessive burden on the interviewee.
- After completing each interview, the interviewer reviewed and clarified notes and submitted the interview results for quality control (QC). During the QC, results were reviewed for completeness and consistency.

A.2.2 Net Savings Data Analysis

The collected free ridership data was analyzed first by computing a direct query-based free ridership from responses on the likelihood of implementing the project absent the program, and likely size, efficiency, and timing of implementation. After estimating free ridership using this direct method, EcoMetric analysts calculated a probable free ridership range based on a series of questions about program influence and other factors that possibly influenced the decision to implement the project. The final project free ridership was then computed by considering the direct query and the range. Figure 8 presents a graphical representation of the calculation approach.

Figure 8: Free Ridership Methodology



EcoMetric computed the free-rider (FR) factors to estimate net savings as shown in the following formula:

*Net savings = verified gross savings * (1 – FR)*

For example, an individual project with 1,000,000 kWh/year of tracking savings, a 95% realization rate, and 10% free ridership would have verified gross savings of 950,000 kWh/year, an NTG ratio of 0.90 (1-FR = 1 - 0.10), and verified net savings of 855,000 kWh/yr.

A.3 Cost Effectiveness Assumptions

- Project costs and benefits are included only for non-incented Energy Manager measures in-service starting in 2019 and included in PY2019 true up and PY2020 reported impacts. This includes only those measures invoiced to the IESO (177 measures).
- Incentives are not included for Energy Manager measures, as the only measures included in this analysis are non-incented. Incremental lifecycle measure costs (when provided) are included at a measure-specific level. EcoMetric sourced the measure costs from project documentation, when available, and the technical reviewer's measure-level database.

- Program admin costs (CE Tool Budget Inputs) were provided by the IESO Evaluation Team for PY2019 and PY2020.
- EcoMetric developed and utilized custom measure-specific load shapes for Energy Manager cost effectiveness analysis where possible to improve the accuracy of the avoided cost calculations. Where custom load shapes are unavailable, EcoMetric utilized the most appropriate IESO-provided load shape based on measure technology and premise type.

A.4 Job Impacts Assumptions

- Project costs and incentives match the values used for the cost effectiveness analysis described in Section 2.2.6.
- As the job impacts analysis focused on jobs created in 2019 and 2020, first-year costs and benefits were used as inputs into the input/output model.